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Welcome to CENIC Today, the monthly newsletter of the Corporation for Education Network Initiatives in California.

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CENIC News

1. President's Message

I'd like to share with the readers of CENIC Today the revised CENIC mission and goals which resulted from discussions during the annual CENIC Board retreat conducted last month at the Kellogg Center, Cal Poly Pomona. This retreat, held for the fifth year, provides the Board an opportunity to reevaluate our purpose and focus on goals and objectives.

Each year's retreat has been productive, with a lot of spirited discussion directed by an outside facilitator. At the beginning of the meeting, John Silvester, Chair of the CENIC Board, officially welcomed to the Board John Anderson, Superintendent of the Imperial County Office of Education, Paul Tichinin, Superintendent of the Mendocino County Office of Education, and Don McNelis, Superintendent of the Butte County Office of Education. This year's retreat was enriched by having these K-12 representatives on the Board for the first time.

The Board revisited CENIC's mission and goals as part of the discussion. At the end of the retreat, we had developed a revised mission and goals. After some wordsmithing, review and approval by the officers of the Board, the following are our revised mission and goals.

MISSION: The mission of the Corporation for Education and Network Initiatives in California (CENIC) is to develop, deploy and operate leading edge network-based services and to facilitate and coordinate their use for the research and education community to advance learning and innovation.

GOALS:

- Operate a robust, cost effective, state-of-the-art communications network for participating education and research institutions;
- Promote high quality end-to-end network services and interoperability among participating institutions;
- Advance the collective and individual interests of participating CENIC institutions by leveraging their diversity and relationships to create benefits to individual members;

- Provide a competitive advantage in the global marketplace to the CENIC Associates' education and research communities;
- Become California's recognized provider of network services for education and research; and,
- Stimulate innovation in teaching, learning and research through use of the network.

CENIC's activities and initiatives are designed to further these mission and goals. If readers have suggestions as to how CENIC can better address either the mission or goals, please don't hesitate to send me an email note at: jdolgonas@cenic.org.

Source: Jim Dolgonas, CENIC

2. NOC Report

Support for NANOG Conference
The North American Network Operators Group (NANOG) is an educational and operational forum for the coordination and dissemination of technical information related to backbone/enterprise networking technologies and operational practices. NANOG meetings are held three times each year, and include two days of short presentations, plus afternoon and evening tutorial sessions. The fall NANOG meeting this year was held in Los Angeles from October 23-25, 2006. CENIC provided IPv6, IPv4, and multicast network services in support of both the NANOG conference and the ARIN meeting that followed on October 26-28. 2006.

Support for Keystone Conference
CENIC's CalREN Video Services (CVS) provided a Multipoint Control Unit (MCU) in support of the second annual Keystone Conference held Oct. 3-5, 2005. The conference used interactive videoconferencing to connect speakers and participants from multiple locations around the globe in a highly successful conference. The primary goal of the Keystone Conference was to demonstrate and discuss best practice uses of technology in education.

Through an elaborate communications grid, MCU's provided by CENIC and others formed the backbone of the conference, simultaneously broadcasting three program strands. Conference participants were able to choose programs from the different strands, customizing a conference experience that best served their needs. More than 125 educators attended the conference on site in Indianapolis. Advanced technology provided by MCU's at organizations such as CENIC enabled the conference to reach more than 1,000 other professionals in 90 locations in 28 states and in six other countries. Remote participants could not only access but also interact with presenters from their local videoconferencing facilities. In total, more than 1,100 educators, videoconferencing leaders, content providers and industry representatives participated in the 2005 Keystone Conference.

Conference organizers commended CENIC's role in providing technical support for the conference. "Thanks to the support of MCU's from throughout the United States - including CENIC - the conference had impressive impact around the globe," said executive planning committee member Ruth Blankenbaker, Executive Director of the Center for Interactive Learning and Collaboration. For more information, please visit the Keystone Conference web site at www.keystoneconference.org.

Source: Sherilyn Evans, CENIC

3. Commodity Peering Improvements

CENIC Network Engineering staff has worked to significantly increase the amount of commodity Internet traffic being exchanged with network peers, rather than with transit providers. Approximately 600 Mbps of additional traffic from new or existing peers has been moved from the for-fee transit providers, representing a cost savings to CENIC Associates of approximately $57,000/month.

CENIC's peering infrastructure was also utilized to support the North American Network Operators' Group (NANOG) conference in Los Angeles this month, carrying a significant portion of that conference's traffic.

Source: Brian Court, CENIC

4. CSU Campus Access Infrastructure Initiative (CAI) Update

During the month of September, CSU Fresno and Humboldt State University were migrated to their GigE connections. CSU Fresno's OC-3 remains in place to provide diversity until their second GigE connection over CENIC managed fiber is completed. Humboldt State's connections have been completed and this campus currently has diverse GigE and OC-3 connections to the CalREN network.

The second GigE connection to San Francisco State University was put into production in early October 2005. This campus currently has two GigE connections to the CalREN network. Ultimately, one of the two GigE connections will be replaced with CENIC provided and managed fiber.

Sonoma State University is scheduled to put its GigE connection into production on October 30, 2005. This campus will retain its OC3 connection for diversity until it can be replaced with a second GigE connection over CENIC managed fiber.

Preparation and construction work is continuing to progress on the CENIC managed fiber connections to Cal Poly Pomona, CSU San Bernardino, CSU Monterey Bay and California Maritime Academy.

An updated CAI installation schedule has recently been posted and is available online at http://www.cenic.org/projects/cai/.

Source: Ed Smith, CENIC

5. Coachella Valley Project

Duct leases have been obtained and construction has begun on the Coachella Valley Metropolitan Area fiber network. MAN construction will be completed in December. By that time, completion of a small construction project in Yuma will allow the lighting of a second CalREN-DC backbone path connecting Palm Desert to San Diego. This will allow the replacement of leased SONET services to College of the Desert and to the Indio office of the Riverside County Office of Education with CalREN Gigabit Ethernet connections, which will provide increased bandwidth at a reduced cost.

The connection of these sites, together with extending the MAN two small sites in the area, will signal the completion of the Coachella Valley project.

Source: Greg Scott, CENIC

6. California Community Colleges Update

Los Positas College in Livermore is the latest California Community College to get its own DS-3 connection to the CalREN-DC network. Columbia College in Sonora is slated to get its DS-3 circuit in November 2005. Provisioning and installation work is progressing on a GigE connection to Palomar College in San Marcos. This high-speed circuit will serve both the campus as well as the California Community Colleges Satellite Network known as CCCSAT.

One of the many challenges we have had was to bring a high-speed circuit to Palo Verde College in Blythe. However, a solution has been identified and construction is underway to bring DS-3 connectivity to Palo Verde College.

Source: Ed Smith, CENIC

7. CENIC 2006-Your Connection to the World Annual Conference

CENIC invites you to its 10th annual conference, CENIC 2006 – Your Connection to the World. Quite possibly the most important networking and educational event of the year, CENIC 2006 is your opportunity to connect with California's key high-performance networking professionals – educators, researchers, business people and government representatives – and help advance the vision of tomorrow's Internet. The 2006 conference offers three days, March 13-15, 2006, of stimulating tracks, influential speakers and a rich array of collaborative panels amidst the diverse downtown setting of the Oakland Marriott City Center hotel and convention center. For the 10th annual meeting, a gigabit connection to the CalREN network will be available for real-time demonstrations. For more information and to submit a conference presentation proposal, visit http://www.cenic.org/events/cenic2006/callforpresentations.htm.

Note: The deadline for presentation proposals is November 18, 2005.

Source: Tad Reynales, 2006 Annual Conference Program Chair

8. Secure IT 2006: Information Technology and Network Security Conference

California State University, San Bernardino will be hosting the 4th annual conference to be held at the Disneyland Hotel, March 21-24, 2006. This conference is being presented by the California State University, the California Community Colleges and the Foundation for California Community Colleges to provide security professionals with the most up-to-date information, tools, trends, legislation, products, services, and strategies for addressing your information and network security issues. For conference information and updates, please visit the Secure IT web site at: http://www.secureitconf.com.

Source: Catherine McKenzie, California Community College Chancellors Office

National Networking News

1. FCC Chairman Urges Better Funding For Rural Telecom Services

By J. Nicholas Hoover
Oct. 26, 2005

The declining costs of phone services, introduction of technologies like voice-over-IP, and a blurring of the lines of what defines a telecom company have decreased fund contributions for rural areas.

Federal Communications Commission Chairman Kevin Martin told Telecom '05 conference attendees in Las Vegas yesterday that he hopes the government will act soon to improve funding for advanced telecom services for rural and isolated businesses, schools and consumers.

"The commission needs to revise the way in which it collects universal service funds," Martin said. The chairman, who grew up in rural North Carolina, noted that the FCC is charged with assuring that rural America doesn't get left behind in services.

The current Universal Services Fund requires interstate telecom carriers to pay taxes into the fund based on their revenue. Introducing broadband and other high-tech telecommunications services to rural areas is cost-prohibitive for carriers, so the fund ensures service by subsidizing small rural carriers, often to the point where subsidies account for a large portion of their revenue.

However, the declining costs of phone services, introduction of technologies like voice-over-IP, and a blurring of the lines of what defines a telecom company have decreased fund contributions and changed the playing field. In Martin's mind, this has created an "outdated" system that ignores an evolving telecommunications marketplace.

Martin proposed an alternative collection scheme whereby companies would pay taxes based on the number of lines they service, not on their total revenues. He noted not everyone is happy with the proposal, and said he is open to any proposal that would make universal service fund contributions more technology-neutral.

Source: Information Week (http://www.informationweek.com/story/showArticle.jhtml?articleID=172900715)

2. Legislation Can't Keep Pace with Technology

By Manav Tanneeru
October 18, 2005

Industry observers say outdated regulations a drag on innovation.

Technological innovation has always ignited a debate over how much government should be involved in its development, and it seems to be no different with broadband.

The Telecommunications Act of 1996 mandated that phone companies share their lines to allow long distance firms to enter local markets and vice versa -- the idea being that the consumer then would have more choices.

The act, signed nearly 10 years ago by President Clinton, had unintended consequences for broadband development, and industry observers contend an overhaul of the act would be an important step toward clarifying the legislative landscape.

"The '96 act, when it regulates the telephone system, imagined a world [where new telephone companies] would compete with existing telephone companies," said Douglas Lichtman, a professor who specializes in telecommunications law and policy at the University of Chicago Law School.

"It built all these regulations about shared access to existing phone networks on the theory that you'd need a new telephone company to compete with an old telephone company, so you have to share access to some part of the existing network."

Though the act did have provisions for emerging technologies, it did not fully anticipate that cable companies would one day offer voice services, phone companies would offer video services, and that there would be Web and wireless services that offer a hybrid of both.

"There are two ways the '96 act is outdated: One is that it doesn't regulate these new technologies themselves, and some of them maybe would benefit from a little guidance and regulation," Lichtman said.

"But two, it regulates the phone system kind of ignoring these new technologies, and even the old technology would be regulated differently once we understood these new technologies would come into the fore."

The 1996 act, though it deals primarily with the phone industry, allowed for a framework to address nascent technologies, Lichtman said.

Guided in part by the 1996 act, the Federal Communications Commission now classifies broadband into two categories: an unregulated information service or a regulated telecommunications service.

The former is generally applied to broadband services offered by cable companies, while the latter is applied to DSL services offered by phone companies.

The distinction is important on several levels. Because of the 1996 act, the phone companies had to share their wires, whereas the cable services did not. The rates for services that are described as "telecommunications" are regulated, whereas those classified as "information" are not.

"The key there is that cable didn't have to worry about making an investment and sharing it with their competitors. We've been subject to that kind of framework since the '96 act was implemented," said Gregg Morton, vice president of legislative affairs for BellSouth Corp.

The FCC earlier this year issued an order placing telephone and cable companies offering broadband services under the same banner.

"Probably the biggest legacy of the act is litigation," Morton said. "We have had challenge after challenge after challenge to the rules that implemented the act, and we still don't have final rules in place, and that brings uncertainty, and uncertainty is not good for any industry, including the telecom industry."

U.S. lags behind other countries
Due to that uncertainty, critics say, the United States now lags behind countries such as South Korea and Japan in Internet and wireless development, where it once was the leader.

"Today, most U.S. homes can access only 'basic' broadband, among the slowest, most expensive and least reliable in the developed world, and the United States has fallen even further behind in mobile phone-based Internet access," Thomas Bleha wrote in a May/June 2005 article in Foreign Affairs magazine.

Industry observers say there are reasons why those countries have surged ahead, primarily government subsidization, the way the population has settled in those countries, and large segments of residents who have bypassed traditional telephony services in favor of broadband access, spurring the market.

With the U.S. market lagging behind, some municipalities such as Philadelphia, Pennsylvania, have acted on their own.

Philadelphia has picked Earthlink Inc. to build a wireless network that will cover 135 miles. The city aims to offer free wireless access in public parks and spaces as part of the plan.

In Utah, 14 cities, frustrated by the lack of access, have come together to create the Utah Telecommunication Open Infrastructure Agency, or UTOPIA, a project working on constructing the infrastructure needed to offer broadband services in those localities. The project began in 2002, and construction started in six of the cities in August 2004.

"By January of next year, we should have 40,000 homes and businesses that should get the service in six of those 14 cities, and we hope to continuously construct over the next three years," said Paul Morris, executive director of UTOPIA.

Municipalities, however, face several obstacles in trying to offer broadband services, including opposition from state legislatures. Some 20 states have either passed or are considering legislation barring municipalities from planning broadband initiatives.

The legislatures may be worried the municipalities could stifle market competition, or that they may be overwhelmed by the demands of sustaining the services, said Lichtman, the law professor.

The industry is also wary of municipalities taking the lead, arguing that offering such access is a complicated matter.

"There are a number of examples of municipalities getting into the telecommunications business and failing miserably," BellSouth's Morton said. "It's been a waste of taxpayer money, and it requires a certain level of expertise that municipalities often don't have."

But UTOPIA's Morris disagrees.

"Municipalities are run by elected officials just like congressmen are elected, and they can make those decisions, and if the citizens are unhappy they can boot them out. So, why would you pre-empt the whole country, when you've got these individual needs for cities that are not getting served adequately?" Morris argued, citing that the Utah Legislature has approved the public-private project he heads.

Solutions for broadband development
Several government-related solutions have been proposed to help in pushing broadband development.

Some observers suggest a new communications act ought to be enacted, especially to change the way the FCC regulates the market.

The FCC ought to become more like the Federal Trade Commission and only intervene when the consumer is threatened by the market, argued Randolph J. May in a July 2005 article for CNET.

"Under the new competition-based standard, the FCC's focus would shift to protecting consumers, rather than competitors, which too often in the past has been its preoccupation," wrote May of the Progress and Freedom Foundation, a self-described "market-oriented" think tank.

Some critics say changing the way the United States allocates its digital spectrum may help development, especially the wireless sector.

"There's a limited amount of stuff that we can put into the air. Right now, we've given a lot of the space to normal television signals," Lichtman said.

"We've given more recently to ABC, CBS and NBC because of high-definition television. So, right now, more than ever before, we've got tons of spectrum locked up in television, and it is right to say that if we didn't have that for television, we might have it for other things, and if it were available for other things, those things might take off faster."

Others have suggested the government should become more active in pushing broadband innovation.

"To move forward, the [Bush] administration should quickly take two steps. First, it should explain clearly the profound ways in which broadband will change work, learning and leisure in the United States," Bleha wrote. "Second, the administration should push the President's Information Technology Advisory Committee (PITAC), a group of private-sector IT leaders and academics, to play a key leadership role in advancing broadband deployment."

But Robert Crandall, an economist at the Brookings Institution, a nonpartisan think tank, advocates a more laissez-faire approach.

"The technology is too uncertain to figure out what to invest in, and it's unclear which companies and competitors should receive government subsidies," he said.

The debate over how much government should be involved in developing the infrastructure for broadband services is not likely to end any time soon.

"The Internet, I think you could argue, is the greatest free market success in the history of man," Morton said. "That has all evolved without one ounce of government regulation, and it is a tremendous success, and it works. We think that's a pretty good model to follow when you look at continuing to get broadband deployed initially, and getting greater speeds deployed after that."

Lichtman added, "It depends on where you put your confidence. Is there a reason you think the market will do a bad job, either under-investing or over-investing in these cases? On the other side, do you have any reason to think the government is going to be good at figuring out how much to invest in a new technology?"

Source: CNN (http://www.cnn.com/2005/TECH/10/17/wireless.legislation/index.html)

3. New Rules On Internet Wiretapping Challenged

By Arshad Mohammed
October 26, 2005

New federal wiretapping rules that would make it easier for law enforcement to monitor e-mails and Internet-based phone calls were challenged by privacy, high-tech and telecommunications groups in federal court yesterday.

The groups argued that the rules would force broadband Internet service providers, including universities and libraries, to pay for redesigning their networks to make them more accessible to court-ordered wiretaps.

The groups also said the Federal Communications Commission rules, scheduled to take effect in May 2007, could erode civil liberties and stifle Internet innovation by imposing technological demands on developers.

"It's simply a very bad idea for privacy and for free speech for the government to design any technology, much less the Internet, to be surveillance-friendly," said Lee Tien, a senior staff lawyer with the Electronic Frontier Foundation, a nonprofit privacy rights group.

The government was trying to "build tentacles of control throughout telecommunications networks," Tien said.

The FCC rules make broadband Internet providers and voice over Internet protocol companies subject to a 1994 federal law that requires telecom companies to assist law enforcement agencies in carrying out court-ordered wiretaps. The Communications Assistance for Law Enforcement Act requires telecom carriers to design their networks so they can quickly intercept communications and deliver them to the government when presented with a court order.

In adopting the rules, the FCC said it wanted to ensure the government could carry out wiretaps as more communications move from the traditional telephone system to the Internet.

"It is clearly not in the public interest to allow terrorists and criminals to avoid lawful surveillance by law enforcement agencies," the commission wrote in its order.

Opponents argued the law was tailored for a simpler, earlier era of traditional telephone service and could cripple the evolution of the Internet by forcing engineers to design products so they can be easily monitored by the government.

The 1994 law "will have a devastating impact on the whole model of technical innovation on the Internet," said John Morris, staff counsel for the Center for Democracy and Technology in Washington, which filed an appeal of the rules with the U.S. Court of Appeals for the District of Columbia Circuit yesterday.

"The Internet evolves through many tens of thousands, or hundreds of thousands, of innovators coming up with brand new ideas," he said. "That is exactly what will be squelched."

Morris said his group did not dispute the idea that the government should be able to carry out court-ordered wiretaps, but rather argued that the 1994 law was a blunt instrument ill-suited for the Internet age.

He said the matter should be referred to Congress, which "can tailor the obligations to the Internet context as opposed to importing the very clumsy [telephone system] obligations and imposing them on the Internet."

The American Council on Education, a higher-education trade group, separately asked the court Monday to review the rules.

"We fear that doing what they want will require every router and every switch in an IT system to be replaced," said Terry W. Hartle, the council's senior vice president. He estimated that the upgrades could cost colleges and universities $6 billion to $7 billion.

"Our quarrel with them is fairly specific," Hartle said. "We are concerned about the cost, and the complexity, and the schedule on which they want this accomplished."

Spokesmen for the FCC and the Justice Department declined comment on the court challenges.

Source: Washington Post (http://www.washingtonpost.com/wp-dyn/content/article/2005/10/25/AR2005102501807.html)

4. FCC Classifies Wireline Broadband Internet Access Service as an Information Service

October 3, 2005

". . . the appropriate framework for wireline broadband Internet access service, including its transmission component, is one that is eligible for a lighter regulatory touch. In the past, the primary, if not sole, facilities-based platform available for the provision of “information services” to consumers was an incumbent local exchange carrier’s telephone network. By contrast, the record before us demonstrates that the broadband Internet access market today is characterized by several emerging platforms and providers, both intermodal and intramodal, in most areas of the country. We are confident that the regulatory regime we adopt in this Order will promote the availability of competitive broadband Internet access services to consumers, via multiple platforms, while ensuring adequate incentives are in place to encourage the deployment and innovation of broadband platforms consistent with our obligations and mandates under the Act."

Source: California Telephone Association (http://www.caltelassn.com/reports05/BroadbandNPRN.pdf)

5. Mergers Win First Approval-SBC and Verizon Pass Justice Dept.; FCC Yet to Rule

By Arshad Mohammed
October 28, 2005

The Justice Department yesterday gave conditional approval to a pair of mergers that make the nation's two largest phone companies far bigger than any other competitors, clearing the way for the Federal Communications Commission to act on the deals, perhaps as soon as today.

The department said it would permit SBC Communications Inc.'s $16 billion acquisition of AT&T Corp. and Verizon Communications Inc.'s $8.5 billion purchase of MCI Inc., provided the companies take steps to maintain competition for some business customers. SBC said yesterday that it will adopt the venerable AT&T name once the merger is completed, preserving a brand whose roots go back to the invention of the telephone.

The resulting companies will control the vast majority of traditional telephone service in many regions of the country. Critics say that power will lead to rising phone bills for consumers, but the companies argue that technology has remade the telecom industry and that competition now comes from wireless, cable and Internet phone companies.

The mergers also must pass muster with the FCC, which is scheduled to meet today and might impose more conditions than those sought by the Justice Department.

The Justice Department negotiated agreements with New York-based Verizon and San Antonio-based SBC to lease certain high-capacity lines to competitors for at least a decade. Each company must do this with lines serving more than 350 buildings around the country.

Without the condition, the businesses in these buildings -- including dozens in the Baltimore-Washington area -- would have had only one choice for service, which critics think would have allowed the merged companies to raise prices with impunity.

The Justice Department did not impose conditions that directly affect residential consumers, a decision that reflects the view that people increasingly can get local telephone service from cable, Internet and mobile phone providers.

Critics said the mergers would push up prices, arguing there are still only two main pipelines to consumer homes -- phone and cable wires -- and that wider competition will take years to build up.

"These mergers undermine growing competition in telecom markets and will surely lead to inflated prices for all telecom and Internet-based services for years to come," said Gene Kimmelman, senior director of public policy at Consumers Union.

In permitting the mergers, the Justice Department is reassembling parts of the AT&T system broken apart in 1984 when the government forced the monopoly to sever its lucrative long-distance arm from the Bell local phone companies in an effort to foster competition.

The fact that it is allowing the mergers to go forward reflects the diminished state of Bedminster, N.J.-based AT&T and Ashburn-based MCI, whose long-distance profits have been eaten away by competition from other providers and mobile and local phone companies.

FCC Chairman Kevin J. Martin has proposed approving the mergers with no conditions but he needs the votes of at least one of the FCC's two Democrats to prevail.

Among other things, the Democrats want SBC and Verizon to sell stand-alone digital subscriber line (DSL) high-speed Internet access at prices that make Internet phone service a viable competitor.

They also want to make sure rates don't go up for business customers with their own "special access" lines. In addition, the Democrats want to prevent the "backbone" companies that carry Internet traffic from arbitrarily cutting each other off, and favor "net neutrality" protections to keep local phone companies from using their networks to interfere with people accessing Internet-based services.

Source: Washington Post (http://www.washingtonpost.com/wp-dyn/content/article/2005/10/27/AR2005102701241_pf.html)

6. UCHRI Launches Cyberinfrastructure for Humanities, Arts and Social Sciences

Irvine, October 12, 2005:

The University of California Research Institute (UCHRI) today announced the launch of the HASS Grid, a major cyberinfrastructure initiative to strengthen research support for the humanities, arts and social sciences.

The HASS Grid will provide a home for digitized artifacts including 3-D, audio, video and text collections vital to research in the HASS communities. Dr. David Theo Goldberg, director of UCHRI, explains: “The HASS Grid provides a base platform for integrating the full range of multimedia cyber-tools in support of accessing and analyzing large databases across the humanities, arts and social sciences. It will prove crucial for future work in cultural representation, the understanding of material culture, their historical conditions and social implications. But it will also offer opportunities to a broader range of intellectual communities to revisit older interests such as the analysis of medieval manuscripts.”

In July 2005 UCHRI began the construction and deployment of cyberbricks. These bricks or storage computers enable access to aggregated, integrated, data-storage systems. Through this system, UCHRI will provide a low-cost, scalable, long-term archive for HASS data collections. UCHRI intends to bring 25 terabytes of storage space online by January 2006.

Initially the HASS Grid will be a test-bed for HASS researchers throughout the University of California. Starting in spring 2006, the system will be released to a wider audience.

UCHRI is working with the Center for Information Technology Research in the Interest of Society (CITRIS) at UC Berkeley and the San Diego Supercomputer Center (SDSC) at UC San Diego to create the systems for storing, accessing, analyzing, and manipulating the data collections crucial to HASS research. Together UCHRI, CITRIS and SDSC are building an interface between the CITRIS Digital Gallery Builder, a 3-D virtual world space for presenting and collaborating on digital collections, and SDSC’s Storage Resource Broker, a client-server middleware designed to manage file collections in heterogeneous, distributed environments.

The term “cyberinfrastructure,” coined by a National Science Foundation blue-ribbon committee, describes new research environments in which advanced computational, collaborative, data acquisition and management services are available to researchers through high-performance networks. To date, the great majority of these new integrated computing environments have been targeted at the sciences.

Grid technology is coordinated resource sharing and problem solving in multi-institutional virtual organizations. Data and computational grids consist of advanced computer technology for sharing resources more effectively. They are part of cutting-edge cyberinfrastructure development that is paving the way for the next generation of information and communications technology and management tools by combining individual desk-top computers into a seamless networks.

The University of California Humanities Research Institute (UCHRI) is a multicampus research unit of the UC Office of the President. UCHRI is based on the UC Irvine campus and serves all ten campuses in the UC system. Recognized nationally and internationally, the Institute promotes collaborative work by teams of researchers representing different fields and institutions both within and beyond the University of California. http://www.uchri.org

The University of California Center for Information Technology Research in the Interest of Society (CITRIS) was established to sponsor collaborative information technology research that will ultimately provide solutions to challenge social and commercial problems affecting the quality of life of all Californians. The set of applications includes energy efficiency, transportation, environmental monitoring, seismic safety, education, cultural research and health care.
http://www.citris.berkeley.edu;
http://www.citris-uc.org/hosted/projects/ith/gallery

The San Diego Supercomputer Center (SDSC) is a world leader in using, innovating and providing information technology to enable innovation in science, engineering, technology development and their applications. SDSC has assumed a leadership role as a national cyberinfrastructure center, funded by the National Science Foundation (NSF).
http://www.sdsc.edu

Contact:
Kevin D. Franklin, Deputy Director
UC Humanities Research Institute
(949) 824-4858

Source: UC Humanities Research Institute (http://www.uchri.org/main.php?page_id=154)

7. Stanford Scientists Design Germanium-Based Device That May Improve Speed of Optical Networks

By Vincent Kiernan
October 27, 2006

In a finding that could lead to more-powerful optical computer networks, researchers at Stanford University have shown that the element germanium can be used to fashion a shutterlike device to control a laser beam.

Such "optoelectronic" devices are used in optical networks, in which computer data are transmitted through fiber-optic lines as bursts of laser light.

At present, optoelectronic devices are manufactured out of exotic materials such as gallium arsenide, which are difficult and expensive to make and to integrate with more common, silicon-based semiconductors.

But germanium is commonly used in semiconductors, so a germanium-based optoelectronic device could be less expensive to manufacture. It could also operate at higher speeds than current optoelectronic devices, the researchers say. Faster devices would increase the capacity of an optical network by enabling it to move more data in a given period of time.

In the Stanford project, detailed in a report in today's issue of *Nature,* researchers used layers of germanium and silicon to construct a tiny "optical modulator" that is less than one one-thousandth of a millimeter thick. Depending on the electrical voltage running across the modulator, it either blocks or transmits a laser beam striking it.

"It has real potential," said James S. Harris, a professor of engineering at Stanford and one of the paper's eight authors. The research was financed by the Intel Corporation and the Defense Advanced Research Projects Agency.

"I think it will enable speeding up of the optical network well above where it is today," said Mr. Harris.

In a commentary published in the same issue of *Nature,* Gareth Parry, a professor of physics at Imperial College London, observed, "Let's hope they are right."

One key question, he wrote, is whether the fabrication process used by the Stanford team would be amenable to mass production at semiconductor factories.

Another scientist agreed. "Scientifically, it is amazing work," said Daniel J. Blumenthal, a professor of electrical and computer engineering at the University of California at Santa Barbara and a member of the Board of Directors of National LambdaRail, a national fiber-optic network for colleges.

But, like Mr. Parry, Mr. Blumenthal cautioned that the research faces many more challenges before it is ready for semiconductor prime time.

As just one example, Mr. Blumenthal said that the Stanford device did not produce enough contrast between the "light" and "dark" settings of the shutter. For practical use, the contrast will have to be as much as 50 times sharper, he said.

Stanford's Mr. Harris remained confident. "We think it will be really easy to introduce this into silicon technology," he said.

Source: The Chronicle of Higher Education (http://chronicle.com/daily/2005/10/2005102703t.htm)

8. The Time Is Now: Bust Up the Box!

John Markoff
October 5, 2005

San Diego - COMPUTING is breaking out of the beige box. Millions of miles of fiber-optic cables are weaving together software that lives on the Internet and data moving at the speed of light into a single global fabric.

It has been almost two decades since Sun Microsystems pioneered the slogan "the network is the computer." Today, after many false starts, that idea is a reality.

Along with relentless technical advances, one force behind this change has been the billions of dollars spent by telecom companies on fiber-optic lines before the end of the tech boom. That splurge was a factor in driving many of those companies into bankruptcy, but also helped reduce the cost of transmitting data.

For decades increases in the speeds of computer networks trailed the exponentially accelerating speed of microprocessor chips. Now the balance between the power of computer processing and networking has fundamentally reversed, and the rapid rise of transmission speeds is beginning to have a revolutionary impact on how computers are used and what they can do.

"That box of things that used to be contained inside of your PC now gets spread out literally on a global basis," said Mike Volpi, a senior vice president at Cisco Systems, the largest networking company in the world. The changes are taking place both at the highest end of the supercomputing world and just as swiftly in the consumer World Wide Web.

Where software applications like Microsoft Word or Autodesk's AutoCAD were once standalone monoliths that functioned in just a single machine, the new distributed applications are now remarkably adaptable. They are frequently spread across large and small computer systems in order to harness more processing power, and programs now dart about through the networks, relocating themselves to save power or to use resources more efficiently.

Google is perhaps the most extreme example of the future of networked computing. Today the company is a major buyer of fiber-optic network capacity to interconnect a computing system that is spread over more than 100,000 processors in over a dozen data centers around the world.

Moreover, for everyday Web surfers, an exploding array of services is being built by using the software equivalent of Lego blocks, as companies like Google, Yahoo and Microsoft begin to make software components available to "mash-up," that is, to link programs running on different servers in different places, in new distributed applications on multiple computers and frequently available free.

Earlier this year a classic mash-up was created by Paul Rademacher, a Silicon Valley programmer who connected apartment rentals on the Craigslist Web site with Google Maps, in the process creating a new Web service, a program that resides simultaneously in many places on the Internet.

That model has initiated a growing array of applications involving so-called distributed computing for corporations, consumers and scientists. "Today we are Google-mashing everything," said Bill St. Arnaud, senior director of advanced networks for Canarie, a government-sponsored high-speed network based in Ottawa that links research laboratories.

It is now possible to connect computers on opposite sides of the world by an optical fiber capable of carrying 10 billion bits of information a second.

Known as "lambdas" - an industry term for optical circuits that carry data - these data superhighways are making it possible to create a new class of supercomputers that have no geographical boundaries.

Such virtual computers are possible to create today because the new optical networks have delays of only the time it takes the speed of light to travel from one point to another. They offer a bridge to a new era of computing.

"People have spoken about how computer networks have flattened the world," said Larry Smarr, an astrophysicist who is director of the California Institute for Telecommunications and Information Technology, known as Calit2, an interdisciplinary research laboratory which will officially open this month at the University of California, San Diego, in La Jolla, and the University of California, Irvine. "But it's more than that, distance is vanishing and the world is now shrinking to a single point."

The implications of ultrafast computer networks composed of optical fibers that stretch around the globe could be seen clearly last month at a supercomputer network workshop, iGrid 2005, held at Calit2's La Jolla building.

This is the fourth such workshop since 1998. They have been held irregularly by scientists and engineers to help master new network and computing technologies, and to build prototypes of computing applications that can span the globe.

Mr. Smarr envisions the new laboratory as the model for the scientific research center of the future. He is bringing together scientific and engineering disciplines and providing them with a range of laboratories that include nanofabrication clean rooms and facilities for visualizing scientific information.

Multimedia artists will be an integral part of the research center and will explore new art forms made possible by high-speed networking.

For example, at the building dedication later this month, Adriene Jenik, an associate professor of computer and media arts at the University of California, San Diego, will preview Specflic 2.0, what she describes as an

example of "speculative distributed cinema." This next-generation style movie will appear on a cluster of networked displays in the courtyard of the new building. Each display will be a window into a different part of the narrative, which will be taking place with both live and filmed actors.

"The story isn't just told, it's experienced," she said.

At iGrid last month a network capacity of 100 billion bits per second was connected to the new Calit2 building, allowing prototypes of scientific visualization applications that have not previously been possible.

There were demonstrations of brute networking power: using networks capable of carrying more than a billion bits of data a second to carry a super high-definition video conference over 9,000 miles between Tokyo and La Jolla, accompanied by a separate stream of hi-fidelity digital sound produced by musicians at LucasArts in Northern California.

There were also the first demonstrations of a new generation of supercomputing power made possible by emerging optical networks like the Global Lambda Integrated Facility, the National Lambda Rail and Teragrid.

These networks not only make it possible to harness the power of multiple supercomputers, but they also allow scientists to create a new class of instruments, in which huge volumes of scientific data are easily available to researchers around the globe.

For example, at the iGrid symposium scientists showed the first high-definition digital video broadcast from an undersea volcanic vent more than a mile beneath the ocean off the northwest coast of the United States.

The video comes from a new undersea observatory being constructed by a United States-Canadian partnership. The system will consist of a web of computers interconnected by fiber-optic sensors on the sea floor intended to monitor everything from geological to climate changes.

The distributed computing system will collect data from thousands of sensors of different types that allow the researchers to build a complete picture of the undersea world.

"This is the new computational science," said Edward Lazowska, a computer scientist at the University of Washington in Seattle and one of the project investigators. In the future, he said, science will be based on data flowing across computer networks that can then be visualized and mined.

For Mr. Smarr, the power of visualization and the need for very high-speed networks was underscored when a team of researchers at the TelaScience Laboratory at San Diego State University worked to assist rescue teams responding to the Indian Ocean tsunami and to Hurricanes Katrina and Rita.

By quickly processing digital satellite image data, the researchers at the university were able to support rescuers with detailed visual maps.

By processing satellite imagery of the Gulf Coast in the wake of Katrina, the researchers correlated satellite imagery with address information, permitting individuals and rescuers to see the impact of the flooding on homes.

The researchers were slowed, Mr. Smarr said, when it took 10 days to transfer the digital data from a United States Geological Survey computer because of a slow computer network.

In commercial data centers, thousands or tens of thousands of server computers can be more rationally used as workloads are moved around to mirror changing needs.

While the United States has been relatively slow in deploying fiber optics directly to homes, that is not true of a growing number of countries in Asia and Europe.

In Japan, for example, there are now three million homes connected directly to the Internet via fiber-optic cables. Compared with typical United States home bandwidth data rates of 500,000 to 1.5 million bits per second, Japan has bandwidth of 100 million bits a second for $30 to $55 a month, according to Osamu Ishida, an engineer at the NTT Network Innovation Laboratories, an advanced development laboratory in near Tokyo.

Although a new computing era is clearly dawning, it does not have a consensus label as was the case with each of the previous eras: mainframe, mini and personal computing.

So far, the new epoch of computing has been described as grid computing, on-demand computing, utility computing, the planetary computer and Web 2.0.

Although the titles are different, they are all efforts to describe an age that will be a fundamental break from earlier computing generations.

"Can you blow up the computer machine room and spread it over the surface of the planet?" Mr. Smarr said. "This is really happening."

Source: New York Times (http://www.nytimes.com/2005/10/05/technology/techspecial/05markoff.html?ei=5070&en=9e1baff1c5a813bc&ex=1130558400&pagewanted=print)

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