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FIVE HIGH-PERFORMANCE BROADBAND PROJECTS TO RECEIVE CENIC 2008 INNOVATIONS IN NETWORKING AWARDS

Projects receive Accolades from California's Research and Education Community

Cypress, CA – March 10, 2008 – Four innovative, cutting-edge educational and research projects in the state of California and the Governor's leadership on broadband access for all Californians have been recognized by the Corporation for Education Network Initiatives in California (CENIC) as *Innovations in Networking* Award Winners for 2008. Awards will be presented on March 11, 2008, in Oakland, CA at CENIC's twelfth annual conference. "CENIC 08: Lightpath to the Stars" will be held at the Oakland Marriott City Center from March 10-12.

CENIC owns, operates, and manages the California Research & Education Network (CalREN), a state-spanning high-performance Internet network consisting of 2,500 miles of optical fiber to which K-20 schools, colleges, universities and other educational and research sites in all 58 of California's counties connect. The most advanced such network in the nation, CalREN serves up to 9.5 million Californians every day and links hundreds of educational and research sites to one another and to colleagues nationally and internationally.

Governor Schwarzenegger's California Broadband Task Force Wins 2008 Gigabit/Broadband Award

Over the past half a dozen or more years' concerns have been expressed regarding the availability of broadband services in California, especially in rural areas. Efforts such as CENIC's own Gigabit or Bust initiative sought to raise the visibility of networking needs across the state.

Shortly after Governor Arnold Schwarzenegger's election to office, he explored using technology to increase the efficiency and effectiveness of state operations. Subsequently, he issued an Executive Order directing state agencies to consider the use of videoconferencing as a way to avoid travel costs. Closely on the heels of a major report by the CA Public Utilities Commission on the status of broadband in California, the Governor issued an Executive Order in October 2006 calling for the creation of a Broadband Task Force to identify steps toward increasing broadband deployment in California.

Pursuant to the Executive Order, Dale Bonner, Secretary of Business, Transportation and Housing, convened and led the task force. The California Broadband Task Force brought together public and private stakeholders to identify barriers to broadband deployment and approaches for reducing them, to identify opportunities for increased broadband adoption, and enable the

creation and deployment of new advanced communication technologies. An accurate snapshot of areas in the state that lack adequate access to broadband services is one of many valuable outcomes of the work of the task force.

The final Task Force report was released on January 17, 2008. The ongoing attention that Governor Schwarzenegger and his staff have given to broadband technology issues is admirable. Through his leadership and his willingness to elevate the importance of broadband deployment and usage in California, the Governor has contributed to a more technology friendly climate in the state, paving the way for additional opportunities for advancement in this area.

K-20 Education Collaborative Effort to Create Rich Online Course to Help California Students Pass Required High School Exit Exam, Wins 2008 Educational Award

The California High School Exit Exam (CAHSEE) represents the state's most recent attempt to improve education by tying graduation to a single standardized measure of competency. Statewide, approximately 48,000 students in the Class of 2006 found themselves unable to get a diploma due to the need to pass one or both portions of the Exit Exam (mathematics and/or English Language Arts), and controversy ensued. In response, the State Legislature made block grants available through the California Community College Chancellor's Office to local Community Colleges that wanted to serve this population of students. The Butte-Glenn and Lake Tahoe Community College Districts independently applied for grants, and finding they shared a common vision on how students should be served, they entered into a partnership, planting the seed that would become the statewide CAHSEE: *Stepping into Your Future* initiative.

Given limited funds, students in roughly forty counties were not going to be able to be served by grant-funded community college programs. Even if sufficient funds were available to offer programs in every county, many 18 and 19 year old students would not be able to participate due to the need to work or meet the needs of young children. That reality drove the Butte-Glenn CCD, the Lake Tahoe CCD and their partners to the conclusion that online opportunities for students were sorely needed.

Teachers, faculty, and staff from the state's K-20 education community, public libraries, and nonprofit community technology centers have worked together to develop two highly engaging hybrid courses that prepare students across the state for the CAHSEE. This CalREN-enabled program includes online interactive exercises as well as "face time" with instructors via web based collaboration tools and/or videoconferencing.

With Pac-10 Internet Video Exchange, 2008 High-Performance Award Winner, Collegiate Athletics Enter the Digital Age via Reliable Broadband Networking

Today, the typical Office of Intercollegiate Athletics is a far different place than what most people knew as "the gym" in past student days. Walk into any coach's office and you will see, besides the normal sports gear, piles and piles of video tapes and DVDs. Video of athletes' performance is critical to coaching today, and all teams analyze their opponent's previous performance. However, to prevent wealthier schools from having an unfair advantage, NCAA rules disallow in-person scouting of opponents. Instead, and with the NCAA's blessing, each team videotapes its own games and exchanges these video files with their next opponent one week before a given game.

Prior to the 2005 season, these video exchanges consisted of exchanging physical media via courier services such as Federal Express. This was an onerous task for all schools, and was particularly so for those schools located long distances from airports or without appropriate courier services. It was also very costly; for example, at UCLA these courier services could cost roughly $6,000 per year per sport.

Many of the video coordinators at the 110 division I-A NCAA schools realized there must be an electronic solution, but attempts to use FTP (the Internet-based File Transfer Protocol) were deemed failures due to extremely long and unreliable file transfer times. For example, a single football game is typically an 18 Gigabit video file, and teams must exchange *all* of their current season's past games each weekend. A single game video transfer could take 10-15 hours and by the end of the season, a team may have ten or more games to transfer.

At a Pac-10 video coordinators' meeting prior to the 2005 football season, Steve Pohl of the University of Oregon suggested the Pac-10 look into using the high-bandwidth connections that academic colleagues already enjoyed through CalREN in California and interconnections across Internet2 to universities in other states. UCLA Video Coordinator Ken Norris contacted Chris Thomas of UCLA's Office of Information Technology asking for assistance. Together, the two men designed a pilot program involving four conference schools (UCLA, USC, Stanford – all CalREN-connected CENIC member institutions, and the University of Washington, plus a site outside the Pac-10 conference, Notre Dame. Instead of using commercial Internet connections, these sites interconnected via high-bandwidth links that all of these schools have to each other via advanced next generation Internet networks for high-speed FTP-based electronic video exchange for the 2005 season, using a specially tuned FTP implementation from the French National Particle Physics Institute in Lyon, France. The increase in speed of transfer over these links turned a previously unsuccessful solution into a viable option.

Based on the success of this pilot, all ten video coordinators for the Pac-10 voted unanimously to move to full electronic exchange for the 2006 season, and the new technology was an unqualified success. No Pac-10 school exchanged conference video via courier, and all participants were delighted by the time savings and ease of electronic video exchange. The success of the program in fact was a significant motivator for some schools to upgrade their connectivity and to improve their own campus networks to eliminate bottlenecks.

The ten Pac-10 video coordinators also responded to the outstanding reliability and predictability of CENIC's CalREN services, and in some particularly illuminating ways. At the beginning of the season, vide coordinators were downloading videos on Saturday night to be sure of meeting their coaches' 5:00 PM Sunday deadlines. As they gained confidence in the system, however, downloads began to take place after noon on Sunday, a clear expression of faith that the network could be counted on for quick, robust delivery of large video files on a regular basis.

High Energy Physics and Digital Cinema Tie for 2008 Experimental/Developmental Award

The bleeding-edge category of Experimental/Developmental Applications includes some of the most far-sighted and visionary research projects anywhere on the globe, and in 2008, CENIC found it impossible to choose only one winner. Consequently, a tie was declared between the

international high-energy physics computing project UltraLight and the equally global, super-high-quality digital media exchange and production projects of CineGrid.

"Ties aren't the sort of thing we work toward," says CENIC President and CEO Jim Dolgonas. "We have four categories, and we generally aim to give four awards. But this year, choosing between UltraLight and CineGrid would simply have been impossible. Both projects are absolutely stunning and showcase everything that a researcher could hope for in terms of what reliable high-performance networking can help them achieve." Adds Dolgonas, "Both projects will be influential in shaping broadband applications for decades to come, and we're thrilled that CENIC could play a central part in enabling them. Enabling California's research and education community is, after all, why we were created."

The UltraLight collaboration is comprised of an international team of researchers currently working on advanced global systems and networks to meet the needs of experiments due to begin at CERN's Large Hadron Collider in 2008. In a demonstration at the SuperComputing 07 conference held last November in Reno, NV, seven individual 10-Gigabit fiber paths (six provided by CENIC and one by Internet2) were used bi-directionally at high efficiency to move vast files of scientific data at blinding transfer rates of 80 Gigabits per second of bi-directional transfer. This is the equivalent of twelve full-length Hollywood movie DVDs in one second!

This achievement relied in part on one of the 2006 Innovations in Networking Award Winners, MonALISA. MonALISA, developed over the last six years by Caltech and its partners at CERN and the Universitatea Politehnica Bucharest, is a globally scalable framework of services to monitor and help manage and optimize the operational performance of computing grids, networks, and running applications in real time. This framework is ideal for creating and dynamically managing dispersed collaborative environments over Internet networks.

From the very tiny, very specialized world of high-energy physics, the next award winner moves to the world of digital cinema and entertainment. The international nonprofit CineGrid promotes research, development, and deployment of ultra-high performance digital media – sound *and* picture – over advanced networks, using grid computing technologies for networked collaboration. CineGrid has organized a number of experimental projects designed both to showcase what advanced networks can support in the world of digital media, and to test those same networks, pushing them as far as they can go in the pursuit of the most immersive possible experience. CineGrid @ Holland Festival 2007 certainly did that and more.

On June 20-21, 2007 CineGrid recorded and streamed live 4K digital motion pictures with 5.1 surround sound of the operatic performance "Era la Notte" from the Holland Festival in Amsterdam over CalREN and partner IP networks to California. The 75-minute live performance was transmitted nearly 10,000 kilometers, in real time, to the University of California, San Diego where it was viewed in 4K on a large screen, with surround-sound, by an audience in the 200-seat auditorium of the California Institute for Telecommunications and Information Technology (Calit2). People in the audience in San Diego reported that they felt as if they were actually in the concert hall in Amsterdam.

This technical experiment was particularly interesting for many reasons but primarily because live performances require utterly reliable throughput and low-latency responsiveness. A less than

perfect connection would be instantly noticed and may not be fixed later since, during a live performance of course, there is no "later."

The CineGrid @ Holland Festival 2007, which is being recognized for the 2008 Experimental/Developmental Award, confirms that even these most demanding types of streaming media distribution can be done over high-performance fiber-optic infrastructure such as CalREN, today.

CENIC will also present an Outstanding Individual Achievement award for 2008 to Jerry Keith in recognition of the outstanding contributions he has made to CENIC and the CalREN community. Not only did Jerry serve as BAC chair and CENIC conference chair multiple years, but he assumed both roles during times of transition, when strong leadership was most essential.

As chair of the CENIC Conference Committee in 2004, the first year in which we handled planning directly, Jerry adeptly managed the relationship with our external events coordinators, providing an essential link between these coordinators and the conference planning committee. As continuing chair of the Conference Committee in 2005, when we brought all logistics for this event in-house, Jerry ensured that every detail was addressed, leading to a successful and well-run conference. In addition to the myriad conference issues, he also provided the wireless equipment and technical resources to create a back-up network connection both years when he realized previous conferences had not included a backup link. Two years later, as the 2007 Conference Chair, he once again provided much-needed guidance due to the departure of our in-house conference coordinator just two short months before the event.

Jerry also took over the role of BAC Chair at a pivotal time. In 2004-05, amid spirited discussion related to the transition of our funding model, Jerry led the successful effort to establish a new fee schedule for member institutions.

CENIC is recognizing Jerry Keith for his leadership in two highly visible areas of interest to the CalREN community during times when good leadership was critical.   We are honored to provide him with this well-deserved recognition.

The awards ceremony will take place at the Oakland Marriott City Center in Oakland, CA on March 11, 2008 at 1:00PM.

Any questions about the awards or the CENIC annual conference "CENIC 08: Lightpath to the Stars" can be directed to Janis Cortese, Manager of Publicity and Communications, at (714) 220-3454 or jcortese@cenic.org.

About CENIC
California's education and research communities leverage their networking resources under CENIC, the Corporation for Education Network Initiatives in California, in order to obtain cost-effective, high-bandwidth networking to support their missions and answer the needs of their faculty, staff, and students. CENIC designs, implements, and operates CalREN, the California Research and Education Network, a high-bandwidth, high-capacity Internet network specially

designed to meet the unique requirements of these communities, and to which the vast majority of the state's K-20 educational institutions are connected. In order to facilitate collaboration in education and research, CENIC also provides connectivity to non-California institutions and industry research organizations with which CENIC's Associate researchers and educators are engaged.

CENIC is governed by its member institutions. Representatives from these institutions also donate expertise through their participation in various committees designed to ensure that CENIC is managed effectively and efficiently, and to support the continued evolution of the network as technology advances. http://www.cenic.org/