

Annual Report



Leading the Way to Tomorrow's Internet

Introduction to CENIC

The Corporation for Education Network Initiatives in California—known as CENIC—is a non-profit corporation founded 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 development, deployment, and operation of a set of seamless and robust advanced network services.

Network Development and Evolution For California Research and Education Community

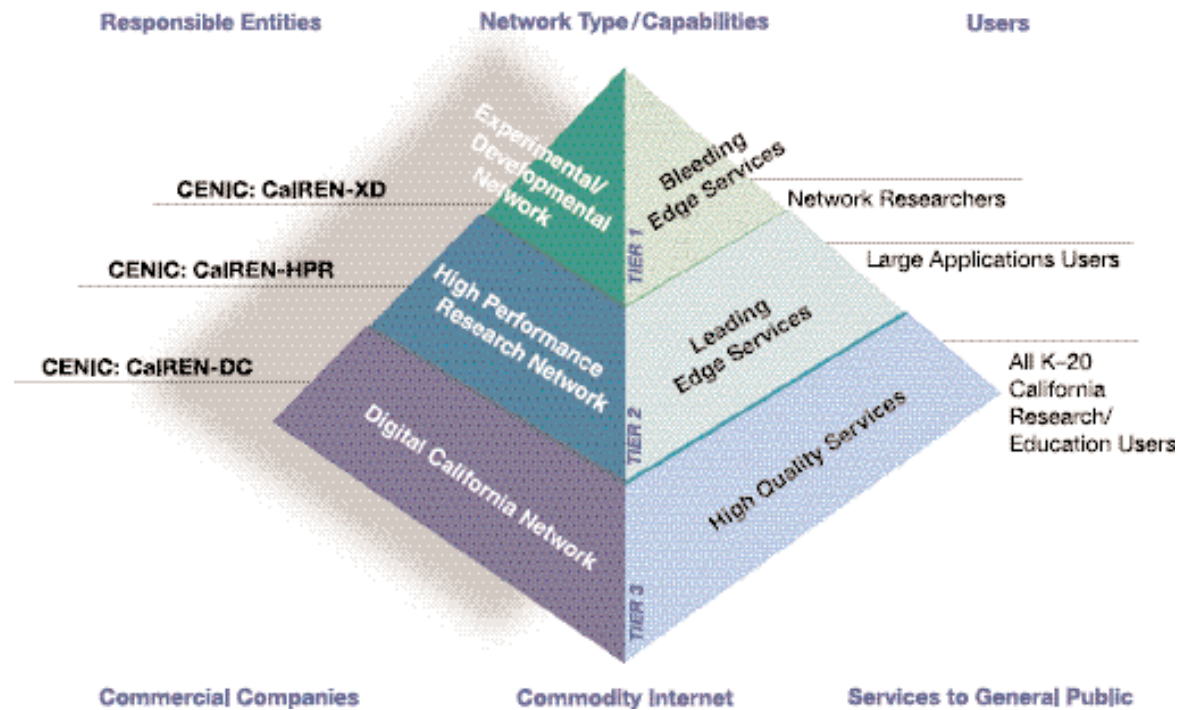


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DEAR FRIENDS AND COLLEAGUES:

When the Corporation for Education Network Initiatives in California was founded in the fall of 1997, we were told that we were attempting to do the impossible.

"There's no way that they'll be able to hold that coalition together," the critics scoffed. "California is just too big. There are too many institutions involved. Their needs are too diverse."

Four years later, we have silenced our critics. CENIC stands now as one of the world's leading providers of advanced network services and one of the most successful developers of advanced-services networks for research and education.

CENIC sits at the forefront of an evolving research and education information infrastructure where there are no boundaries—only unlimited potential for new and exciting applications. Currently, we are in the process of developing three major projects for research and education in California:

- ▲ The California Research and Education Network-2 (CalREN-2) serves over three million students and faculty members at over 40 California institutions of higher education with a wide variety of advanced network services;
- ▲ The Digital California Project is extending California's high-performance network resources into all 58 counties in order to provide California's 6,000,000 K-12 students and teachers with an exciting new generation of Internet resources;
- ▲ The Optical Network Infrastructure Initiative is creating a new optical foundation to serve the networking needs of all of California's universities, research institutions, community colleges, and K-12 schools. This powerful optical backbone greatly enhances CENIC's ability to provide the highest-quality advanced network services to all of CENIC's constituents.

We invite you to read about the successes we enjoyed over the past year.

Tom West
President/Executive Director
CENIC

John Silvester
Chairman of the Board
CENIC

Highlights of the Past Year

CENIC enabled additional research and education opportunities for the five CENIC Charter Associate universities—the California Institute of Technology and the Jet Propulsion Laboratory, the California State University System, Stanford University, the University of California System, and the University of Southern California and the Information Sciences Institute:

- ▲ Connected CalREN-2's north and south SONET (Synchronous Optical Network) rings via a shared OC-12 (622Mbps) link of 4CNet.
- ▲ Linked Mexico's Corporacion Universitaria para el Desarrollo de Internet's (CUDI) network to CalREN-2 at the San Diego Supercomputer Center.
- ▲ Maintained CalREN-2's high quality of service over the past year, providing a high-performance and stable network for higher education throughout California.

CENIC expanded its Peering and Internet Services Provider programs:

- ▲ Negotiated contracts with the Information Sciences Institute of the University of Southern California, the San Diego Supercomputer Center, and with PAIX (connected via Stanford University) to provide

increased peering arrangements (Internet connections) for users of CalREN-2.

- ▲ Aggregated the growing demand for commercial Internet services of the CENIC Charter Universities, community colleges, and the K-12 schools served by the Digital California Project by negotiating with commercial providers to acquire deeply discounted ISP services for the entire research and education community.

CENIC initiated the extension of CalREN-2's advanced networking service capabilities to the K-12 education community statewide through the Digital California Project (DCP). In 10 months, CENIC:

- ▲ Formed the DCP Program Steering Committee (PSC), with representatives from 16 major educational organizations. The DCP PSC has overseen the planning and implementation of DCP.
- ▲ Launched the DCP Network Planning Team, consisting of technical experts for the 11 K-12 planning regions, to work with the DCP Network Architect in developing the detailed implementation plan. This team completed an assessment of needs and developed the first phase of the implementation plan by mid-January.

- ▲ Issued an RFP for the equipment, installation and circuits. Contracts were awarded to Pacific Bell, Williams Communications, and Verizon at the end of March.

- ▲ Upgraded the 4CNet portion of the shared CalREN-2/4CNet backbone to OC-12 speeds to serve DCP. (Note: 4CNet is the network that serves the California State University and the California Community College systems.) The CalREN-2/4CNet backbone was made operational for DCP in early April.

- ▲ Installed and made operational the first two DCP nodes in San Luis Obispo and Fresno counties in late April.

CENIC launched its most ambitious planning effort to date, the Optical Network Infrastructure (ONI) initiative. The ONI is aimed at upgrading, expanding and integrating the capabilities of CalREN-2 and 4CNet to serve the full range of networking needs across the entire California research and education community. As part of Phase 1, the CENIC ONI Architecture team:

- ▲ Conducted a comprehensive study of fiber locations and availability throughout California in the fall.

The CENIC Mission:

ADVANCED NETWORKING FOR CALIFORNIA

- ▲ Identified over 15 private sector providers as potential partners to participate in the design and implementation of the ONI.
- ▲ Met and reviewed conceptual design proposals presented by 12 private firms between March and June.
- ▲ Integrated components of the design into a detailed network architecture design.
- ▲ Hired a full-time ONI Project Director.
- ▲ Launched Phase 2 to select the final set of private firms with which to work on the final design, implementation plan, schedule, and financial models for the new multi-tiered CalREN-2.

The Corporation for Education Network Initiatives in California is developing a high-performance advanced-services communications infrastructure for research and education in California.

Building a robust and cost-effective network infrastructure, however, is an on-going process. In order to continue its success, CENIC must deal with a set of important challenges:

- ▲ CENIC must continue to maintain California's advanced-services network resources in order to provide the connectivity and the high quality of service expected by its five charter universities. CENIC provides the important network support services necessary to ensure that every researcher, faculty member, and student in California can make use of the latest high-performance network tools and applications.
- ▲ CENIC must look for opportunities to extend California's network infrastructure to all areas of the state in order to ensure that all of California's researchers and educators can enjoy the opportunities provided by today's advanced-services networks.
- ▲ CENIC must make the most of recent advances in networking technology in order to ensure that research and education in California can take advantage of a state-of-the-art infrastructure.

In order to achieve these goals, CENIC is implementing three major initiatives:

- ▲ First, CENIC's California Research and Education Network (CalREN-2) provides research and education institutions in California with a powerful advanced services network. CalREN-2 is the California analog of Internet2, the national next generation research and educational network.
- ▲ Second, utilizing the CalREN-2 infrastructure, CENIC's Digital California Project is providing all 58 California counties with access to a seamless advanced-services network for all levels of education, from kindergarten through graduate school.
- ▲ Third, CENIC's Optical Network Infrastructure Initiative (ONI) is creating a new optical foundation to serve the networking needs of all of California's universities, research institutions, community colleges, and K-12 schools. This powerful optical backbone greatly enhances CENIC's ability to provide the highest-quality advanced network services to all of its constituents.

The Network Development and Evolution for California's Research and Education pyramid (on the inside front cover) depicts the framework CENIC is using to continuously plan, update and evolve its networking capabilities from research and experimentation, through advanced uses, to general deployment.

CENIC's CalREN-2 Network:

CALIFORNIA'S RESEARCH AND EDUCATION NETWORK

CalREN-2 is the statewide backbone research network that connects over 40 institutions of higher education in California. In service since October 1998, CalREN-2 supports a wide range of applications and research endeavors that demand advanced network services.

CalREN-2 enables the use of these and other advanced networking capabilities:

- ▲ Remote Instrumentation
- ▲ Multicasting
- ▲ Videostreaming
- ▲ Virtual Classrooms
- ▲ Large-Scale Distributed Digital Storage
- ▲ Distributed 3D Interactive Simulation
- ▲ Remote Imaging, Analysis and Diagnosis

CENIC's CalREN-2 is part of the national Internet2 Project. CalREN-2 is connected to Abilene, which is an advanced services backbone network operated by Internet2. Abilene connects regional network aggregation points, called GigaPops, to support the work of Internet2 universities as they develop advanced research and instructional applications. More than 180 universities are part of the Internet2 project.

The major features of the CalREN-2 network are depicted in the CalREN-2 map on the inside back cover of this report; additional information is contained on the CalREN-2 Web site at www.cenic.org/CR2.html.

CENIC—Extending Access through

In the 2000-2001 fiscal year, Governor Gray Davis and the California State Legislature approved funding for the Digital California Project (DCP). Through DCP, CENIC is developing a cohesive and seamless statewide high-speed advanced services network that enables K-12 schools in each of California's 58 counties to interconnect with each other and with all of the institutions of higher education in the Golden State.

Through this extension of CalREN-2, California's K-12 schools will have the opportunity to be linked to Internet2 (as well as the commercial Internet) in order to take advantage of a wide variety of learning resources and educational applications from around the world.

The goals of the Digital California Project are to:

- ▲ Provide a common, robust statewide network communications infrastructure foundation for the K-20 systems in California;
- ▲ Create an environment that facilitates collaboration between California's K-12 and higher education communities;
- ▲ Facilitate access to multimedia content resources for teaching and learning in K-12;
- ▲ Create access to information age tools required to use technology effectively in the classroom.

A map of how the CalREN-2/4CNet backbone is being extended into the 58 counties to serve K-12 is shown on the inside back cover of this report.. The official Digital California planning and implementation documents can be found on the Web at www.cenic.org/dcp.html.

CSU-LA: The Virtual Center for Spatial Analysis and Remote Sensing (VCSARS)

VCSARS uses high-performance networks to acquire and analyze a wide range of biological, ecological, and geographical information in order to both enhance research and teaching and to inform the public about environmental issues. VCSARS uses the advanced-services network capability afforded by CalREN-2 to serve as a "virtual center" for image processing and data analysis that researchers anywhere in the world can access.

<http://vcsars.calstatela.edu/>

CSU-Sonoma: Virtual Courseware for Science Education

Virtual Courseware for Science Education is an ongoing project dedicated to developing interactive Web-based activities for the Life and Earth Sciences. These activities are designed to enhance the learning and teaching of scientific principles at the undergraduate college and university level as well as at the high school AP level.

<http://vcourseware.sonoma.edu/>

Digital California Project (DCP)

During this year:

- ▲ A Digital California Project Steering Committee representing 16 educational entities was formed in September 2000 to oversee the planning and monitor the progress in network development, applications coordination, communications, and project management.
- ▲ The Network Planning Team completed the planning tasks, including a detailed need assessment and implementation plan, in January 2001.
- ▲ As a result of an RFP, a major contract for equipment, circuits, and installation was awarded to Pacific Bell. In addition, contracts for selected circuits were awarded to Williams Communications and Verizon.
- ▲ The Digital California Network Planning Team completed the planning tasks, including a detailed needs assessment, in January 2001. As a result of an RFP, a contract for equipment, circuits, and installation was awarded to Pacific Bell. In addition, contracts for advanced circuits were awarded to Williams Communications and Verizon.
- ▲ The first county-based access nodes were installed in San Luis Obispo and Fresno counties in late April.
- ▲ The Applications Team efforts were launched in April.
- ▲ The Communications Team successfully launched a comprehensive information program to inform K-12 constituencies and the State Legislature. A brochure was developed and distributed. Presentations were made at several conferences. The *DCP Today* newsletter is delivered via e-mail to interested subscribers.
- ▲ To serve the DCP, 4CNet was upgraded to OC-12 speeds.

Stanford University: Digital Michelangelo Project

The Digital Michelangelo Project uses complex laser scanning techniques and image processing algorithms to create vibrant three-dimensional digital models of the greatest of Michelangelo's masterpieces. Soon, students and scholars from around the world will be able to use high-performance networks to view (and interact with) a 'virtual gallery' of these models on-line.
<http://www-graphics.stanford.edu/projects/dli/>

CalTech: Digital Sky

The Digital Sky Project is an initiative that combines terabytes of information from optical, radio, and infrared telescopes into a single database that students and researchers can interact with using advanced-services Internet networks. The Digital Sky and the tools for its exploration—is already revolutionizing astronomical studies, both by the sheer increase of the data available, and by providing faster and more sophisticated methods for its analysis.
http://www.cacr.caltech.edu/SDA/digital_sky.html

USC/ISI: Advanced Distance Education

The Advanced Distance Education project is developing Web-based tools for the creation of adaptive, on-line courseware incorporating artificial intelligence. One such tool, ADELE, consists of a two-dimensional animated 'persona' that presents classroom material in a variety of ways while providing hints and rationales to guide students through the lesson.
<http://www.isi.edu/isd/carte/carte-projects.htm>

CENIC's Optical Network Infrastructure Initiative (ONI)

CENIC believes that optical networks represent an important step forward for research and education in California.

CENIC's Optical Network Infrastructure Initiative (ONI) is creating a new multi-tiered optical foundation to serve the advanced networking needs of all of California's universities, research institutions, community colleges, and K-12 schools. The ONI will build on, and eventually integrate, the existing educational network backbones (CalREN-2 and 4CNet) in California.

ONI is being collaboratively developed with a number of strategic carrier partners to:

- ▲ Provide fiber and wavelength-based network connectivity to and among 46 primary research and higher education locations. In addition, it will provide connectivity for all 125 community college sites and the access node sites serving all K-12 schools across the 58 California counties.

- ▲ Provide a network connectivity solution that is cost-effective for CENIC and its Charter Associate universities, community colleges, K-12 and all of the research and education community in California.

The ONI is being developed based on IP standards. The focus is on building a fiber and wavelength-based infrastructure that can be expanded over time without appreciable increases in costs. CENIC intends to manage and operate the new network just as it operates CALREN-2 today, i.e., through the 4CNet Network Operations Center located in Los Alamitos.

Similar to the structure of the CalREN-2 and 4CNet networks in use today, the ONI is expected to have eight main infrastructure components:

- ▲ Campus clusters in the San Francisco Bay area and in the Los Angeles Basin;
- ▲ Communities in and around San Diego and Sacramento;
- ▲ Central and coastal corridors as key parts of the backbone;
- ▲ Remote northern California sites (Humboldt and Chico); and
- ▲ An overlay of dark fibers to selected sites for network research projects.

Over the past four years CENIC has gradually extended the scope of access to advanced capabilities. CENIC is committed to providing network capabilities that support the evergrowing,

diverse and changing requirements of the research and education community throughout California. The Network Development and Evolution for California's Research and Education pyramid (found on the inside front cover) shows the overall framework that CENIC is using to plan, develop and evolve network capabilities for the California research and education community.

The ONI is slated to be completed by the end of 2002.

During this past year:

- ▲ A comprehensive study of fiber locations and availability throughout California was completed in January by Science Applications International (SAIC) under a consulting contract. This study formed the framework for launching the ONI "Call for Partners."
- ▲ Through the first round "Call for Partners" process, more than 15 potential partners were identified and asked to submit proposals for the ONI.
- ▲ Planning will continue into fall 2001, and implementation will occur throughout 2002.

CENIC's Network Support Initiatives

In addition to building and managing an advanced networking infrastructure for all educational sectors in California, CENIC sponsors a variety of partnerships designed to increase educational and scientific awareness and use of advanced network applications.

CENIC also participates in outreach initiatives with organizations at the state, national, and international levels that promote networking and applications development to support research and education. These outreach initiatives expand the reach of CENIC networking and applications activities beyond the borders of California to include Mexico, other western states, and national and international organizations.

Following are the major events from the past year associated with CENIC network support initiatives:

Corporate Partner Associates

- ▲ Cisco Systems and Pacific Bell were instrumental in promoting state financial support for CENIC's Digital California Project.
- ▲ Nortel Networks and the University and Community College Systems of Nevada became new CENIC Partner Associates in the spring. CommerceNet became a CENIC Sponsor. National Marine Fisheries Service, Raytheon Technical Services, Royal Institute of Technology, Science Applications International Corporation, and Stanford Linear Accelerator Center became CENIC Affiliates.

Corporacion Universitaria para el Desarrollo de Internet (CUDI)

The Corporacion Universitaria para el Desarrollo de Internet (CUDI) is a non-profit corporation with members from the public and private sectors in

Mexico whose purpose is to develop high capacity telecommunications networks for scientific and educational activities. CENIC and CUDI have a Memorandum of Understanding to promote appropriate research and teaching collaborations among their institutions and to interconnect their networks. CUDI and CalREN-2 networks link in San Diego.

- ▲ The physical link of CUDI to CalREN-2 was made operational in early September between the San Diego Supercomputer Center and the Telmex office in Tijuana. CENIC facilitated this collaborative relationship.

CalPoly: Virtual Factory

The Industrial and Manufacturing Engineering Department at CalPoly is developing a virtual factory to enable faculty and student researchers to develop industrial products or consumer goods by creating prototypes with a fully interfaced suite of rapid prototyping equipment, then review various aspects of mass manufacturing and verify the suitability and feasibility of relevant design parameters using linked modeling and virtual machinery.

<http://virtual.ime.calpoly.edu/vf/>

UCB: The Berkeley Distributed Video-on-Demand (VOD) System

VOD is the product of a research project that is designed to provide access to a large quantity of video information over computer networks. Clients across the Internet can submit requests to the VOD system to view audio, video and graphical streams. Playback is accomplished by streaming data from a media file server through the network to the client's computer.

<http://www.bmrc.berkeley.edu/research/storage/>

UCD: Virtual Policy Research Facility

UC Davis is working with the Department of Defense and the Naval Postgraduate School to use high-performance networks to develop a virtual policy research facility. This will include an "Open Forum" in which policy-makers and researchers will debate and discuss topics of interest concerning strategic changes in the world as well as a "Virtual Conference Room," a protected place where policy-makers can meet in real-time for one-on-one or multi-party exchanges.

CENIC's Network Support Initiatives

- ▲ CENIC is working with the University of California MEXUS program and its counterparts at each of the Charter Associate universities. UC MEXUS and Mexico's CONACYT have an agreement to work together to foster collaborative research. UC MEXUS and CONACYT have agreed to use \$400,000 of grant funds for Internet2 applications.

UCI: D-Zero Experiment

Physicists at UCI use their connection to CalREN-2 to participate in a worldwide collaboration of scientists conducting research on the fundamental nature of matter located at the high-energy particle accelerator at the Fermi National Accelerator Laboratory.

<http://www-d0.fnal.gov/>

UCLA: Cuneiform Digital Library Initiative

The Cuneiform Digital Library Initiative (CDLI) represents the efforts of an international group of specialists, museum curators, and historians of science to make available through the Internet the form and content of cuneiform tablets dating from the beginning of writing. The CDLI on-line database consists of texts, document transliterations, text glossaries, and photo archives of early cuneiform.

<http://cdli.ucla.edu/>

UCR: Group Videoconferencing and Computing

The high energy physics group at UC-Riverside uses their high-performance connection to CalREN-2 to "virtually" attend important laboratory meetings at the Fermi National Accelerator Laboratory near Chicago.

The University and Community College System of Nevada (UCCSN)

- ▲ UCCSN became a CENIC Network Associate. Its NevadaNet was connected to CalREN-2 between Las Vegas and Anaheim. In late fall 2001, NevadaNet and CalREN-2 will be connected between Reno and Sacramento.
- ▲ CENIC and UCCSN agreed to have NevadaNet serve as a DCP hub site in Reno. This is the most cost-effective way to serve K-12 schools located in some eastern counties of California.

Pacific Internet2 (PI2)

The Pacific Internet2 coalition was created in 1999 to further the research, teaching, and advanced networking goals of its participants and to extend the reach of their collaboration to other entities along the Pacific Rim. The PI2 is a coalition of universities in Alaska, Washington, Oregon, Hawaii, Nevada, and California that are working to leverage resources to facilitate research collaboration by linking networks that form part of Internet2.

University Corporation for Advanced Internet Development (UCAID)

The University Corporation for Advanced Internet Development (UCAID) is a consortium of over 180 universities and other institutions founded to develop the next generation Internet, or Internet2. CENIC institutions are among the founding members of UCAID, and are actively involved in all facets of Internet2, including governance, infrastructure development, applications, and middleware.

CENIC's CalREN-2 has two OC-12 connections to UCAID's national Internet2 backbone, Abilene. Abilene and the extended connectivity of peer networks allow advanced network application collaboration between California institutions and partners worldwide.

- ▲ CENIC and 4CNet enabled all California K-20 institutions to gain access to Internet2 by joining UCAID as a Sponsored Education Group Participant (SEGP).
- ▲ CENIC joined its sister regional/statewide network aggregators (i.e., GigaPops) to form the QUILT Project under UCAID. QUILT is designed to develop a broad range of advanced networking services for their constituents and to facilitate innovative projects that enhance working relationships among the GigaPops.

EDUCAUSE

CENIC is a member of the EDUCAUSE Net@EDU program. Net@EDU has formed the Broadband Pricing Group (BPG) with CENIC as an active participant. The BPG's goals are to provide all research and education institutions with cost efficient bandwidth and facilitate the deployment of a seamless and robust nationwide network. Some of the ideas and strategies of CENIC's Optical Network Infrastructure initiative originated with the BPG in the form of white papers and recommendations submitted to UCAID and EDUCAUSE.

International Educational Equal Access Foundation (IEEAF)

The IEEAF seeks to enhance educational access to bandwidth for educational institutions and their academic, research and services uses by providing network assets, facilities, space, and resources. It does so by promoting partnerships with government, private entities, and educational institutions to facilitate education in communities, and across states. The Foundation pursues strategies designed to secure and leverage network-related assets, and to capitalize on events associated with the build-out of the global submarine and terrestrial fiber optics networks.

- ▲ CENIC assisted in the formation of this foundation. CENIC appoints three members to the IEEEAF Board.
- ▲ Plans have been approved by the CSU Board of Trustees to permit a private firm to construct a carrier facility on the CSU Hayward campus. CENIC has requested space at the carrier site for its use.

National Laboratory For Advanced Network Research (NLANR)

The NLANR provides application, engineering and traffic analysis support for the National Science Foundation's high performance connections sites and high performance network providers. NLANR is a distributed organization composed of three parts: applications and user support, engineering services, and measurement and analysis. CENIC is in the process of developing an inventory of advanced applications at Charter Associate universities, using the NLANR database framework.

- ▲ In conjunction with NLANR, CENIC sponsored a workshop on multicasting at the University of California, Berkeley, and one on data mining at the University of California, Los Angeles; additional workshops are planned for the coming year.

Public Outreach

- ▲ The CENIC Web page at www.cenic.org has been enhanced and updated.
- ▲ E-mail newsletters *CENIC Today* and *CENIC's CoolApp* continue to be published on a regular basis. *DCP Today* has been added

to provide communication about the DCP. Free subscriptions to these newsletters are available on the CENIC Web site.

- ▲ *InterAct*, a networking applications magazine, was developed to feature researchers, faculty, staff and students who are using advanced networking as part of their work. The first issue was developed jointly with SDSC and published in May.
- ▲ The CENIC 2001 annual conference was held in San Diego in May and drew more than 200 participants.

Governmental Relations

The DCP is a major state-supported network initiative that has required the close collaboration of the Governor, Legislature, and educational sectors at all levels, with CENIC as the management organization.

- ▲ CENIC, the California Technology Trade and Commerce Agency, and CommerceNet formed a working relationship to foster the development of commercial Internet2 applications. CENIC and CommerceNet agreed to reciprocate as Sponsor Associates to each other's organization.

UCSB: Alexandria Digital Earth Prototype (ADEPT)

Following on the successes of the Alexandria Digital Library Project (ADL), ADEPT is using high-performance networks in order to create web-based interfaces that bring together a diverse collection of on-line information sources, image collections, and distributed databases for any of a number of classroom or research topics.

<http://www.alexandria.ucsb.edu/>

UCSC: REINAS

The Real-Time Environmental Information Network and Analysis System (REINAS) gives environmental scientists the ability to observe, monitor, and analyze regional oceanographic and meteorological phenomena from their desktop via high-performance networks. REINAS consists of three integrated components: a wide array of remote sensors, a series of distributed databases which store the information collected by the sensors, and an interface that researchers can use on-line to interact with the data.

<http://csl.cse.ucsc.edu/projects/reinas/>

UCSD: The Collaboratory for Microscopic Digital Anatomy (CMDA)

CDMA is developing a collaborative environment to let a researcher at a remote site collect and analyze data from instruments (such as electron microscopes) at another location. CMDA 2.0 is in use with collaborators at Oregon State University, Cold Spring Harbor Laboratory, Queen's Medical Center at the University of Hawaii, Montana State University, and the ultra high voltage electron microscope (UHVEM) Laboratory in Osaka, Japan.

<http://www-ncmir.ucsd.edu/CMDA/>

CENIC Charter Associates

CALIFORNIA INSTITUTE OF TECHNOLOGY

Jet Propulsion Laboratory

STANFORD UNIVERSITY

Stanford Linear Accelerator Center

Stanford Medical Center

CALIFORNIA STATE UNIVERSITY

California Maritime Academy

California Polytechnic State University, San Luis Obispo

California State Polytechnic University, Pomona

CSU Bakersfield

CSU Channel Islands

CSU Chico

CSU Dominguez Hills

CSU Fresno

CSU Fullerton

CSU Hayward

CSU Long Beach

CSU Los Angeles

CSU Monterey Bay

CSU Northridge

CSU Sacramento

CSU San Bernardino

CSU San Marcos

CSU Stanislaus

Humboldt State University

San Diego State University

San Francisco State University

San Jose State University

Sonoma State University

UNIVERSITY OF CALIFORNIA

UC Berkeley

UC Davis

UC Irvine

UC Los Angeles

UC Merced

UC Riverside

UC San Diego

UC San Francisco

UC Santa Barbara

UC Santa Cruz

UNIVERSITY OF SOUTHERN CALIFORNIA

Health Sciences Campus

Information Sciences Institute

University Park Campus

CENIC's History

California's research centers, corporate organizations, and institutions of higher education have cradled the growth of high technology in the United States for many decades. Many of the early innovations in both computer hardware and software originated in the state, and CENIC continues that tradition in the field of network technologies.

In 1996, the five major universities in California formed a consortium to consolidate the California strategy for participation in Internet2. In August 1997, CENIC officially became a not-for-profit corporation.

In early 1997, the National Science Foundation provided seed funding to CENIC to help launch the CalREN-2 network, complementing major funding provided by CENIC's five founding institutions. Two grant awards recognized more than 40 research and instructional applications across these institutions that required advanced network services.

Collectively, the five CENIC charter universities span a wide geographic, academic, and research range. The 33 campuses of the two public systems (10 in the University of California and 23 in the California State University), and the three independent universities (the California Institute of Technology, Stanford University, and the University of Southern California) all enjoy world-class reputations for their research and academic programs. CENIC universities and their related research institutes, laboratories, hospitals, and affiliate organizations are major intellectual, economic, and social influences at the local and national levels, and across the world.

Similarly, CENIC enjoys the support of three major corporations as Partner Associates: Cisco Systems, Nortel Networks and Pacific Bell. Cisco Systems and Pacific Bell have been CENIC Partner Associates since 1997. CENIC's networks and collaborative environment provide an important test-bed for corporate associates, including start-up corporations and research organizations that wish to refine innovative products before bringing them to market. Collaborations with corporate associates join technical expertise and resources with advanced research and teaching.

CENIC nurtures discipline-specific, collaborative work groups in fields ranging from astronomy to telemedicine, from environmental and urban planning to the arts, and from the life sciences to computer science. The CalREN-2 network enables the use of advanced research applications in areas such as: remote instrumentation; multicasting; videostreaming; virtual classrooms; large-scale distributed digital storage; distributed 3D interactive simulations; and remote imaging, analysis and diagnosis. These applications carry important social and economic implications for California and the nation.

CENIC Board of Directors and Advisory Groups

Current CENIC Board of Directors:

1997	<i>Chair</i> –John Silvester, USC
1997	<i>Vice-Chair</i> –Jack McCredie, UC
1999	<i>Secretary</i> –David Ernst, CSU
1998	<i>Treasurer</i> –John Charles, CSU
2001	John Bruno, UC
2001	Bill Campbell, UC
1999	John Dundas, Caltech
1999	Ron Johnson, Outside
2001	Larry Smarr, Outside
1999	Jan Thomson, Stanford
2001	Michael Vildibill, Outside
1999	John Welty, CSU

Past CENIC Board Members:

1997-1999	Gary Adams, CSU
1999-2000	Jim Dolgonas, UC
1999-1999	John Donegan, Outside
1997-1999	Rich Fagen, Caltech
1997-1998	Raman Khanna, Stanford
1997-1998	Sid Karin, Outside
1998-1999	Jay Kohn, Stanford
1997-1999	Stuart Lynn, UC
1999-2001	Stuart Lynn, Outside
1997-2000	Kumar Patel, UC
1997-1998	Dave Reese, CSU
1997-1999	Tom West, CSU

Current Advisory Council Chairs:

Applications Advisory Council

Kevin Barron, UCSB and
Gayle Byock, UCLA

Business Advisory Council

Doug Hartline, UCD

Technology Advisory Council

Michael Van Norman, UCLA

Digital California Project Program

Steering Committee

Executives:

Chair: Jack McCredie, UC
Vice-Chair: David Meaney, California County
Superintendents Education Services Association

CENIC Board Representatives:

- ▲ David Ernst, CSU
- ▲ John Silvester, USC
- ▲ Jan Thomson, Stanford

Representatives from Educational Organizations:

- ▲ John Anderson, California County
Superintendents Education
Services Association
- ▲ Catherine Banker, Curriculum Development
and Supplemental Materials Commission
- ▲ Beth Benedetti, Association of Independent
California Colleges and Universities
- ▲ Patricia Cabrera, Office of the
Secretary of Education
- ▲ Mark Crase, California State University System

- ▲ Bernie Hanlon, Small School
Districts Association
- ▲ Elaine Johnson, California Federation
of Teachers
- ▲ Susie Lange, California Department
of Education
- ▲ Dennis Lewis, California Teachers Association
- ▲ Bill Loftus, Association of California
School Administrators
- ▲ Frank Pugh, California School
Boards Association
- ▲ Don Shelton, California Association
of School Business Officers
- ▲ Robert Walczak, Computing
Using Educators, Inc.
- ▲ Warren Williams, CEDPA
- ▲ LeBaron Woodyard, California Community
College System
- ▲ Julius Zelmanowitz, University of California

Ex-Officio (Non-Voting):

Tom West, CENIC

UCSF: Remote Use of the UCSF Computer Graphics Lab

The UCSF Computer Graphics Laboratory (CGL) serves a national community of biomedical researchers by providing access to state-of-the-art hardware and software for interactive molecular modeling applications. A new initiative is currently underway to provide a remote collaborative environment so that scientists at distant locations can access the facility and collaborate with one another.

<http://www.cgl.ucsf.edu>

Corporation for Education Network Initiatives in California

**Financial Statements as of and for the Years Ended June 30, 2001 and 2000,
Supplemental Schedules as of and for the Year Ended June 30, 2001,
and Independent Auditors' Report**

INDEPENDENT AUDITORS' REPORT

Board of Directors

Corporation for Education Network Initiatives in California

We have audited the accompanying statements of financial position of the Corporation for Education Network Initiatives in California ("CENIC") as of June 30, 2001 and 2000, and the related statements of activities and cash flows for the years then ended. These financial statements are the responsibility of CENIC's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with auditing standards generally accepted in the United States of America. These standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that audits provide a reasonable basis for our opinion.

In our opinion, such financial statements present fairly, in all material respects, the financial position of CENIC at June 30, 2001 and 2000, and the changes in its net assets and its cash flows for the years then ended in conformity with accounting principles generally accepted in the United States of America.

Our audits were conducted for the purpose of forming an opinion on the basic financial statements taken as whole. The supplemental schedules listed in the accompanying table of contents at June 30, 2001 and for the year then ended are presented for the purpose of additional analysis of the basic combined financial statements rather than to present the financial position, changes in its net assets, and cash flows of the individual projects and are not a required part of the basic combined financial statements. These schedules are the responsibility of Corporation for Education Network Initiatives in California's management. Such schedules have been subjected to the audit procedures applied in our audits of the basic combined financial statements and, in our opinion, are fairly stated in all material respects when considered in relation to the basic combined financial statements taken as a whole.

Deloitte & Touche

August 31, 2001

Corporation for Education Network Initiatives in California

STATEMENTS OF FINANCIAL POSITION

June 30, 2001 and 2000

ASSETS

CURRENT ASSETS:	2001	2000
Cash and cash equivalents	\$ 30,888,293	\$ 2,868,115
Investments (Note 3)		755,994
Accounts receivable	57,521	893,795
Prepaid expenses	398,793	246,234
	<hr/>	<hr/>
TOTAL	\$ 31,344,607	\$ 4,764,138

LIABILITIES AND NET ASSETS

LIABILITIES:		
Accounts payable and accrued expenses	\$ 2,290,969	\$ 494,178
Deferred revenues (Note 6)	24,996,291	2,302,143
	<hr/>	<hr/>
Total liabilities	\$ 27,287,260	\$ 2,796,321
UNRESTRICTED NET ASSETS:		
Board designated—equipment replacement	\$ 2,435,500	\$ 1,390,000
Undesignated	1,621,847	577,817
	<hr/>	<hr/>
Total unrestricted net assets	4,057,347	1,967,817
	<hr/>	<hr/>
TOTAL	\$ 31,344,607	\$ 4,764,138

See notes to financial statements

Corporation for Education Network Initiatives in California

STATEMENTS OF ACTIVITIES

YEARS ENDED JUNE 30, 2001 AND 2000

REVENUES AND OTHER SUPPORT:	2001	2000
Network fees	\$ 4,890,212	\$ 2,063,685
Association and membership fees	359,726	215,857
Conference income	56,552	48,947
DCP income (Note 6)	7,323,638	
Investment Income (Note 3)	839,944	61,414
	<hr/>	<hr/>
Total revenues and other support	\$ 13,470,072	\$ 2,389,903
EXPENSES:		
Network costs	\$ 3,541,076	\$ 1,529,561
Development	7,168,694	86,321
Conference	71,281	64,298
Outside professional services	46,463	45,092
Executive salary	160,000	150,000
General and administrative	393,028	109,537
	<hr/>	<hr/>
Total expenses	\$ 11,380,542	\$ 1,984,809
CHANGE IN UNRESTRICTED NET ASSETS	\$ 2,089,530	\$ 405,094
UNRESTRICTED NET ASSETS, BEGINNING OF YEAR	\$ 1,967,817	\$ 1,562,723
UNRESTRICTED NET ASSETS, END OF YEAR	\$ 4,057,347	\$ 1,967,817

See notes to financial statements

Corporation for Education Network Initiatives in California

STATEMENTS OF CASH FLOWS

YEARS ENDED JUNE 30, 2001 AND 2000

CASH FLOWS FROM OPERATING ACTIVITIES	2001	2000
Changes in net assets	\$ 2,089,530	\$ 405,094
Adjustments to reconcile changes in net assets to net cash provided by operating activities:		
Net unrealized loss on investments	32,315	6,813
Provisions for uncollectible accounts receivable		7,500
Changes in operating assets and liabilities:		
Decrease (Increase) in accounts receivable	836,274	(37,489)
Increase in prepaid expenses	(152,559)	(246,234)
Increase (decrease) in accounts payable and accrued expenses	1,796,791	(26,842)
Increase in deferred revenues	\$ 22,694,148	\$ 2,302,143
 Net cash provided by operating activities	 <u>\$ 27,296,499</u>	 <u>\$ 2,410,985</u>
 CASH FLOWS FROM INVESTING ACTIVITIES		
Sale (purchase) of investments, net	<u>\$ 723,679</u>	<u>\$ (762,807)</u>
 INCREASE IN CASH AND CASH EQUIVALENTS	 <u>\$ 28,020,178</u>	 <u>\$ 1,648,178</u>
 CASH AND CASH EQUIVALENTS, BEGINNING OF YEAR	 <u>\$ 2,868,115</u>	 <u>\$ 1,219,937</u>
 CASH AND CASH EQUIVALENTS, END OF YEAR	 <u>\$ 30,888,293</u>	 <u>\$ 2,868,115</u>

See notes to financial statements

Corporation for Education Network Initiatives in California

NOTES TO FINANCIAL STATEMENTS, YEARS ENDED JUNE 30, 2001 AND 2000

1. ORGANIZATION

The Corporation for Education Network Initiatives in California ("CENIC") was incorporated on July 31, 1997 and formed by the California Institute of Technology, the California State University system, Stanford University, the University of California system, and the University of Southern California (the "Charter Associates"). CENIC's mission is to facilitate and coordinate the development, deployment, and operation of a set of robust intercampus communications services. Its networks support advanced applications to enhance California's leadership in research and education. "CENIC" operating costs will be covered from annual dues and fees for services provided to the Charter Associates.

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES AND PROCEDURES

Basis of Presentation—CENIC reports information regarding its financial position and activities according to three classes of net assets: unrestricted net assets, temporarily restricted net assets, and permanently restricted net assets.

Revenues, expenses, gains, and losses are recorded and classified as unrestricted, temporarily restricted or permanently restricted based on the existences or absence of donor-imposed restrictions. When donor-imposed restrictions are met, temporarily restricted net assets are reclassified to unrestricted net assets and reported in the statement of activities as net assets released from restrictions. At June 30, 2001 and 2000, there were no temporarily or permanently restricted net assets. Included within unrestricted net assets are board designated reserves for equipment replacement totaling \$2,435,500 and \$1,390,000 at June 30, 2001 and 2000, respectively.

Cash and Cash Equivalents—Cash and cash equivalents are short-term, highly liquid investments with maturities of three months or less at the time of purchase.

Revenues—Network fees represent contractual amounts between various Charter Associates and CENIC for services to be performed in regards to the California Research and Educational Network Project

("CalREN-2") (see Note 5) and Digital California Project ("DCP") (see Note 6). Association and membership fees are collected from higher education institutions, corporations, and research-oriented organizations. Conference income is generated from sponsors and participants of conferences help by CENIC. Network fees, association and membership fees, and conference income are recognized as revenue when such income is earned.

Expenses—The major costs of CENIC are the expenditures for leasing lines, equipment, and services provided by various telecommunications companies. All costs of CENIC are expensed as incurred.

Income Taxes—CENIC is exempt from federal income taxes pursuant to Section 501(c)(3) of the Internal Revenue Code. Accordingly, no provision for federal income tax has been recorded in the accompanying financial statements. CENIC has received a favorable determination letter, dated February 22, 1999, from the Internal Revenue Service indicating that it qualifies for tax-exempt status. CENIC is also exempt from California income taxes under the related state provisions. Management believes that CENIC will continue to be exempt from taxes.

Use of Estimates—The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates

3. INVESTMENTS

CENIC sold its investment in Franklin Floating Rate Fund in April 2001, which generated a realized loss of \$32,315 for the year. At June 30, 2000, this investment had a fair value of \$755,944.

Investment income consists of the following for the years ended June 30, 2001 and 2000:

	2001	2000
Interest and dividend income	\$872,259	\$68,227
Net unrealized loss on investments	(32,315)	(6,813)
	<u>\$839, 944</u>	<u>\$61,414</u>

4. THE NATIONAL SCIENCE FOUNDATION GRANT

In 1998, the Charter Associates and the University of California Office of the President were successful in competing for a National Science Foundation ("NSF") award to help fund the CalREN-2 Project (see Note 5). This \$3.8 million NSF grant is administered through the University of California Office of the President with the intent of ultimately donating the equipment to CENIC.

5. CALREN-2 PROJECT

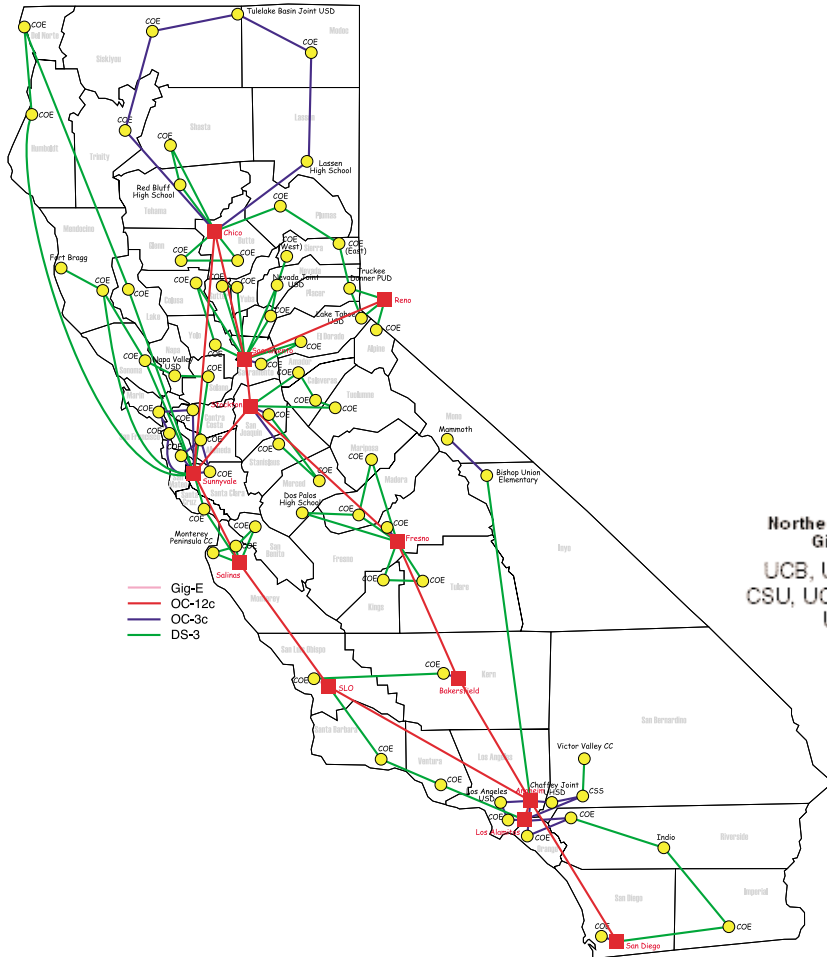
With support from the National Science Foundation (see Note 4) and matching institutional funds from its Charter Associates, CENIC launched CalREN-2 to support broadband research and education applications. CalREN-2 enables the use of advanced networking capabilities; such as, remote instrumentation, multicasting, video streaming, virtual classrooms, large scale distributed digital storage, distributed 3D interactive simulation, and remote imaging, analysis, and diagnosis. CalREN-2 is an integral part of Internet2, the national networking initiative launched by over 135 leading universities.

6. DIGITAL CALIFORNIA PROJECT

DCP will be developed to facilitate the sharing of programs and resources among schools, grades K–12, across California by using a dedicated advanced services network. Funding for DCP will be provided by the State of California to the University of California Office of the President, who will contract with CENIC to provide the respective services. Annual funding for this project will approximate \$31 million. At June 30, 2001, approximately \$24 million is recorded as deferred revenue in the statement of financial position. DCP income is earned as services are provided by CENIC. During fiscal year 2001, CENIC recorded \$7.3 million as revenue in the statement of activities.

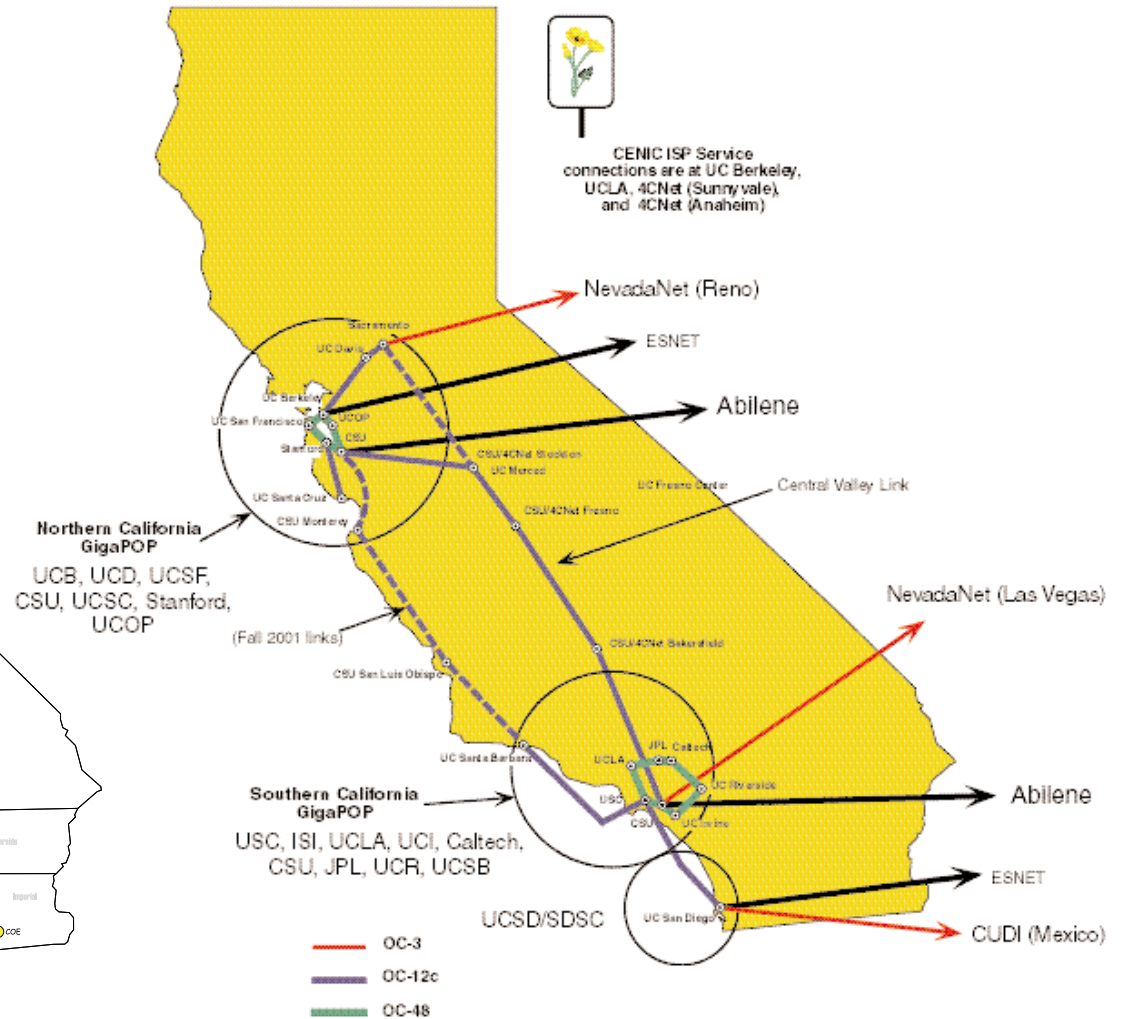
Digital California Project

Round 1 Node Sites ▲ April 11, 2001



CalREN-2 Network

Corporation for Education Network Initiatives in California



September 2001



Corporation for Education Network Initiatives in California

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