The Corporation for Education Network Initiatives in California

2007-08 Annual Report

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Letter from the President

In this, the 2007-08 CENIC Annual Report, I am delighted to show you the current state not only of CENIC's CalREN network and the services delivered over it, but of the corporation that was created to bring it to life, as well as a selection of the achievements made possible when the world's most vibrant and innovative research and education community has access to everything that high-performance networking can offer.

In 1997 when CENIC was founded, the creation of a world-class fiber-based network linking California's research and education community from kindergartens to post-graduate universities was not a pipe dream by any means. However, representatives from that community knew that it would not be easy to make their dream a reality. In order to empower themselves to create the network they knew was necessary to maintain California's position of global leadership, they — indeed, all of you — created CENIC as the means by which your networking needs and those of your faculty, staff, and students would be met and exceeded.

Jim Dolgonas
President & CEO
CENIC

In the ten years since then, both CENIC and public recognition of the importance of broadband networking at all levels have matured. What was once the bailiwick of academic researchers has become a hot topic at all levels of discourse. At the close of the 2007-08 fiscal year, the CalREN network now connects more Californians than ever to more research and education networks throughout North America and beyond, providing a high-performance fiber path between researchers and educators in California and colleagues anywhere in the world. With the completion of the DC Network Router Refresh Project, discussed in this report, the bandwidth of the production CalREN-DC network has increased fourfold, and the network itself has been significantly future-proofed. We have also added high-capacity circuits to connect existing and new members to CalREN, and national and international networking projects have expanded.

And yet these accomplishments must stand aside for what the CENIC community itself has achieved in the past fiscal year — innovations in research and education that have greatly expanded our ideas of what is possible while improving the lives of millions of Californians. Four such projects were recognized this past year with CENIC Innovations in Networking Awards, along with our Governor's visionary support for broadband networking throughout California. You can read more about these projects and others in this report as well.

After all, while the CalREN network is the focus of most of the day-to-day efforts of CENIC, the network is not truly at the heart of why CENIC was created. Since CENIC is composed of all of you, your missions are ultimately ours. Thus, CENIC shares with the CENIC Associates, Board of Directors, committees and councils, and corporate partners the goal of bringing to life the best possible future for California and the world through high-performance networking.

The last ten years since 1997 stand as proud evidence of the California K-20 research and education community's efforts toward building that future. I'd like to congratulate you on your achievements, thank you for your involvement in CENIC, and look forward to what the next ten years will bring.

About CENIC & the CENIC Associates

Pictured from top: Inderkum High School (Sacramento, CA),
College of the Canyons (Valencia, CA),
Sonoma State University (Rohnert Park, CA)

In 1998, CENIC's California Research & Education Network (CalREN) began serving the network needs of California's research universities. In 2000, CENIC expanded CalREN's network services to the state's K-12 community. By the 2003-04 fiscal year, CalREN was the single network serving the entire education community in California, including the California K-12 System, California's Community Colleges, the California State University system, the University of California system, the California Institute of Technology, the University of Southern California, and Stanford University. Today, CENIC is a major player in both the national and international networking arenas and manages the largest and most robust statewide optical network for education in the nation.

Since its inception, CENIC's primary focus has been on serving the networking needs of the Golden State's research & education community by offering robust, high-quality, high-capacity, cost-effective networking services.

The Mission & Goals of 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 & Education Network. CalREN is 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 CalREN for 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.

Pictured from left: University of Southern California Viterbi School of Engineering (Los Angeles, CA), UC Davis Mondavi Center (Davis, CA)

CENIC is committed to the following goals:

- Continuously improving a robust, cost-effective, state-of-the-art communications network, accessible to participating education and research institutions,

- Working with member institutions to define a value chain of services, and developing innovative ways to deliver scalable solutions to members,

- Leading efforts of participating institutions to provide end-to-end service quality and interoperability among member institutions, and promoting adoption across network boundaries,

- Advancing the collective interests of the institutions by leveraging their diversity and relationships to accrue benefits to individual members,

- Providing a competitive advantage in the global marketplace to the education and research communities,

- Communicating the value of CENIC as California's recognized provider of network services for education and research,

- Providing opportunities for innovation in teaching, learning, and research through use of the network, and

- Strengthening participation in the state, national, and international education and research networking communities.

Core Values & Guiding Principles

The **CENIC Core Values** describe the standards by which CENIC and its employees operate. These values do not change with time or circumstance and should not be compromised. They are the underpinnings of our corporate culture and should be reflected in everything we do.

- **Integrity:** We conduct ourselves according to high ethical standards.
- **Stewardship:** We respect the resources our Associates have entrusted to us — time, money, effort, and intellectual capital — and pledge to act as responsible stewards of all of these.
- **Accountability:** We take responsibility for our conduct in dealings with each other and our Associates.
- **Respect:** We act with consideration, tolerance, and dignity towards others.

The **CENIC Guiding Principles** describe in broad terms the factors that inform and help determine CENIC's actions and decisions. In most cases, the actions and decisions reflect the application of CENIC Core Values to specific situations through striking a balance between or among extremes suggested by applying these principles in isolation.

- **Excellence:** We conscientiously strive for quality and distinction in our work.
- **Initiative:** We proactively identify and take the appropriate actions needed to provide solutions.
- **Collaboration:** We work cooperatively with each other and with our Associates in support of shared goals and common interests.
- **Service:** We recognize our role in helping our Associates achieve their missions.
- **Innovation:** We value creativity in the pursuit of new technologies and solutions when appropriate.
- **Reliability:** We recognize the importance of the services provided to our Associates and their dependence upon those services.

The California Research & Education Community

Initiative

Excellence

Collaboration

Integrity

Stewardship

cenic

Accountability

Respect

Service

Reliability

Innovation

HOMECOMING

The 2007-08 CENIC Board of Directors

Jim Davis, Chair
Associate Vice Chancellor,
Information Technology
UC Los Angeles

David Ernst, Vice Chair
Assistant Vice Chancellor,
Information Technology
Services
Chief Information Officer
CSU Chancellor's Office

Kristine Hafner, Sec'y
Chief Information Officer
Associate Vice President,
Information Resources and
Communications
UC Office of the President

John Charles, Treasurer
Chief Information Officer
CSU East Bay

Jim Dolgonas, Ex Officio
President and Chief
Executive Officer
CENIC

Patrick Perry
Vice Chancellor
California Community
Colleges System Office

John Silvester
Professor, Department of
Electrical Engineering
Systems
University of Southern
California

John Dundas
Director, Information
Management Systems &
Services
California Institute of
Technology

Catherine McKenzie
Specialist, Information
Systems and Analysis
California Community
Colleges System Office

Frederick Sherman
Vice Chancellor of
Technology, Educational
Technology Services
Chief Technology Officer
Foothill-De Anza Community
College District

Ruben Armiñana
President
Sonoma State University

Jay Kohn
Executive Director
Computing Services
Information Technology
Services
Stanford University

Chuck Rowley
Associate Vice Chancellor,
Computing &
Communications
UC Riverside

John Anderson
Superintendent
Imperial County Office of
Education

Gavin Payne
Chief Deputy
Superintendent of Public
Instruction
California Department of
Education

Don McNelis
Superintendent
Butte County Office of
Education

Ron Johnson
Vice President, UW
Technology
University of Washington

Larry Smarr
Director
California Institute for
Telecommunications &
Information Technology
Professor, Jacobs School
of Engineering
UC San Diego

Pictured from left: Chuck Rowley (UC Riverside), Jeremy Powell (San Bernardino County Superintendent of Schools), Jim Davis (UCLA), Patrick Perry (CCC System Office), Ken Lindahl (UC Berkeley), John Charles (CSU East Bay), Doug Hartline (UC Santa Cruz), Keric Ashley (CA Dept. of Education), John Dundas (Caltech), Jim Dolgonas (CENIC), Fred Sherman (Foothill-DeAnza CCD), David Ernst (CSU Chancellor's Office), Deborah Ludford (North Orange County CCD), Kristine Hafner (UC Office of the President), John Anderson (Imperial COE)

2007-08 CENIC Committees & Councils

Business Advisory Council
Doug Hartline, Chair
Director, Core Technologies
Information Technology
Services
UC Santa Cruz

Chair, HPR Network Technical Advisory Council
Ken Lindahl
Information Services &
Technology
Infrastructure Services
UC Berkeley

Chair, DC Network Technical Advisory Council
Jeremy Powell
Manager, Technical Services
San Bernardino County
Superintendent of Schools

CENIC Relationships: Internet2 • www.internet2.edu

Internet2 is a not-for-profit advanced networking consortium comprising more than 200 U.S. universities in cooperation with 70 leading corporations, 45 government agencies, laboratories, and other institutions of higher learning as well as over 50 international partner organizations.

Internet2 members leverage the organization's high-performance network infrastructure and extensive worldwide partnerships to support and enhance their educational and research missions. Beyond just providing network capacity, Internet2 actively engages its community in the development of important new technology including middleware, security, network research, and performance measurement capabilities which are critical to the progress of the Internet.

CENIC Relationships: National LambdaRail • www.nlr.net

National LambdaRail is advancing the research, clinical, and educational goals of its members and other institutions by establishing and maintaining a unique nationwide network infrastructure that is owned and controlled by the US research community. Ownership of the underlying optical infrastructure ensures the research community unprecedented control and flexibility in meeting the requirements of the most advanced network applications and providing the resources demanded by cutting-edge network research.

The defining characteristic of the NLR infrastructure is its ability to support many distinct networks for the US research community using the same core infrastructure. Experimental and production networks exist side-by-side but are physically and operationally separate. Production networks support cutting-edge applications by providing users guaranteed levels of reliability, availability, and performance. At the same time, experimental networks enable the deployment and testing of new networking technologies, providing researchers national-scale test beds without the limitations typically associated with production networks.

Audit Committee:
Don McNelis, Chair
Mark Crase, California State University
Jim Dolgonas
Doug Hartline
Catherine McKenzie
Frederick Sherman

Finance Committee:
John Charles, Chair
John Anderson
Jim Dolgonas
Kristine Hafner
Doug Hartline
Patrick Perry
Sam Steinhardt, Stanford University
Trevor Stewart, Butte-Glenn Community College District

Teaching, Learning, and DC Network Committee:
Catherine McKenzie, Chair
Jim Dolgonas
Louis Fox, University of Washington
Don McNelis
Paul Tichinin, Mendocino County Office of Education

XD/HPR Committee:
John Dundas, Chair
Jim Davis
Tom DeFanti, UC San Diego
Jim Dolgonas
Rodger Hess, UC Davis
Greg Hidley, UC San Diego
Russ Hobby, UC Davis
Ron Johnson
Ken Lindahl
David Reese, CENIC
Pete Siegal, UC Davis
John Silvester
Larry Smarr

Jerry Keith — 2008 Outstanding Individual Achievement Award

Jerry Keith served as Business Advisory Council (BAC) chair and CENIC Conference Committee chair multiple years, assuming both roles in times of transition when strong leadership was essential. As CENIC Conference Committee chair in 2004, Jerry managed the relationship with our external events coordinators, providing an essential link between them and the conference committee during the transition to in-house planning. As chair of the Committee in 2005, Jerry again ensured that every detail was addressed, leading to a very successful conference. He also provided the wireless equipment and technical resources to create a back-up network connection both years. As 2007 Conference Chair, he again provided crucial guidance upon the departure of our in-house conference coordinator just two months before the event.

Jerry also assumed the role of BAC Chair at a pivotal time. In 2004-05, amid transition of our funding model, Jerry led the effort to establish a new fee schedule.

Jerry Keith accepts the 2008 Outstanding Individual Achievement Award from Jim Dolgonas (CENIC)

The 2007-08 CENIC Charter Community

California K-12 System

Alameda COE
Alpine COE
Amador COE
Bishop Union Elementary
Butte COE
Calaveras COE
CA Department of
   Education
Chaffey Joint UHSD
Chowchilla School
   District
Colusa COE
Contra Costa COE
Del Norte COE
Dos Palos High School
El Dorado COE
Eureka City Schools
Fort Bragg Mendocino
   Coast Center
Fresno COE
Glenn COE
Humboldt COE
Imperial COE
Kern COE
Kings COE
Lake COE
Lake Tahoe USD
Lassen COE
Los Angeles COE
Los Angeles USD
Loyalton High School
Madera COE
Mammoth High School
Marin COE
Mariposa COE

Mendocino COE
   (River Center)
Merced COE
Modoc COE
Monterey COE
Monterey Peninsula CC
Napa Valley USD
Nevada Joint UHSD
Northern Humboldt UHSD
Orange CDE
Placer COE
Plumas COE
Pomona USD
Red Bluff High School
Riverside COE
Riverside COE (Indio)
Sacramento COE
San Benito COE
San Bernardino CSS
San Diego COE
San Francisco COE
San Joaquin COE

San Luis Obispo COE
San Mateo COE
Santa Barbara COE
Santa Clara COE
Santa Cruz COE
Shasta COE
Sierra COE - West
Siskiyou COE
Solano COE
Sonoma COE
Stanislaus COE
Sutter County Schools
Trinity COE
Truckee Donner PUD
Tulare COE
Tulelake Basin Joint USD
Tuolumne COE
Ventura COE
Victor Valley CC
Yolo COE
Yuba COE

Pictured: Los Gatos High School (Los Gatos, CA)

California Community Colleges

Alameda
Allan Hancock
American River
Antelope Valley
Bakersfield
Barstow
Berkeley City
Butte
Cabrillo
Cañada
Canyons
Cerritos
Cerro Coso
Chabot
Chaffey
Citrus
Coastline
Columbia
Contra Costa
Copper Mountain
Cosumnes River
Crafton Hills
Cuesta
Cuyamaca
Cypress
De Anza
Desert
Diablo Valley
East Los Angeles
El Camino
Evergreen Valley
Feather River
Folsom Lake
Foothill
Fresno City
Fullerton

Gavilan
Glendale
Golden West
Grossmont
Hartnell
Imperial Valley
Irvine Valley
Lake Tahoe
Laney
Las Positas
Lassen
Long Beach City
Los Angeles City
Los Angeles
    Harbor
Los Angeles
    Mission
Los Angeles
    Pierce
Los Angeles
    Southwest
Los Angeles
    Trade Tech
Los Angeles
    Valley
Los Medanos
Marin
Mendocino
Merced
Merritt
MiraCosta
Mission
Modesto Junior
Monterey
    Peninsula
Moorpark

Mt. San Antonio
Mt. San Jacinto
Napa Valley
Ohlone
Orange Coast
Oxnard
Palomar
Palo Verde
Pasadena City
Porterville
Redwoods
Reedley
Rio Hondo
Riverside
Sacramento City
Saddleback
San Bernardino
    Valley
San Diego City
San Diego Mesa
San Diego
    Miramar
San Francisco City
San Joaquin Delta
San Jose City

San Mateo
Santa Ana
Santa Barbara
    City
Santa Monica
Santa Rosa
Santiago Canyon
Sequoias
Shasta
Sierra
Siskiyous
Skyline
Solano
Southwestern
System Office
Taft
Ventura
Victor Valley
West Hills College
    Coalinga
West Hills College
    Lemoore
West Los Angeles
West Valley
Yuba

Pictured: Los Angeles Pierce College (Los Angeles, CA)

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 East Bay

CSU Fresno
CSU Fullerton
CSU Long Beach
CSU Los Angeles
CSU Monterey Bay
CSU Northridge
CSU Sacramento
CSU San Bernardino
CSU San Marcos
CSU Stanislaus
Chancellor's Office

Humboldt State
    University
Moss Landing Marine
    Laboratories
San Diego State
    University
San Francisco State
    University
San Jose State
    University
Sonoma State University

The University of California

UC Berkeley
UC Davis
UC Irvine
UC Los Angeles

UC Merced
UC Office of the
    President
UC Riverside

UC San Diego
UC San Francisco
UC Santa Barbara
UC Santa Cruz

California Private Universities

California Institute of
    Technology
    Jet Propulsion
        Laboratory

Stanford University
    Stanford Linear
        Accelerator Center
    Stanford Medical
        Center

University of Southern
    California
    Health Sciences
        Campus
    Information Sciences
        Institute

The 2007-08 CalREN Associate Community

The Naval Postgraduate
   School
NASA Ames Research
   Center
Monterey Bay Aquarium
   Research Institute
Pepperdine University

University of San Diego
University of San
   Francisco
The Wharton School of
   the University of
   Pennsylvania, Wharton
   West Campus

The Nevada System of
   Higher Education
Arizona State University
University of Arizona

CENIC Relationships: Association of Pacific Rim Universities • www.apru.org

Formed in 1997, the Association of Pacific Rim Universities (APRU) is a consortium of 37 leading research universities in the Pacific Rim. APRU aims to foster education, research, and enterprise in the Pacific Rim, thereby contributing to economic, scientific, and cultural advancement through collaboration among Pacific Rim economies. In both its objectives and guiding principles, APRU embodies a commitment to global academic and research standards.

APRU recognizes that its activities can be powerful catalysts for expanding educational, economic, and technological cooperation among the Pacific Rim economies. In this regard, the association seeks to promote dialogue and collaboration between academic institutions in Pacific Rim economies so that they can become effective players in the global knowledge economy.

CENIC Relationships: EDUCAUSE • www.educause.edu

EDUCAUSE is the nation's leading professional organization for information technology in higher education. CENIC is a member of the EDUCAUSE Net@EDU program, created in July 1998 with the merging of the Networking and Telecommunications Taskforce and the Federation of American Research Networks.

Net@EDU helps higher education shape and take full advantage of emerging networking opportunities. Its activities span the spectrum of academic and cutting-edge research networking, from the administration of campus and state networks, to identifying the most appropriate network projects for implementation, to acting as a national center for research and advocacy in network policy issues.

CENIC Relationships: Internet Educational Equal Access Foundation • www.ieeaf.org

The Internet Educational Equal Access Foundation (IEEAF) is a non-profit corporation created by its member institutions to accept assets donated to the global education community by a broadly defined telecommunication industry and corporate community. Founding member institutions include the Corporation for Education Network Initiatives in California (CENIC), the Pacific Northwest Gigapop, the Pacific Internet2 Coalition, the University of Maryland, and GEO.

Working with its members and affiliates, IEEAF works to obtain donated assets or right to use such assets, to include communications infrastructure (fiber, conduit, rights of way), collocation facilities or services. These donated assets are then made available to qualified not-for-profit "Asset Stewards" to place them into useful service for the research and education community.

Financial Summary

	FY 05-06	FY 06-07	FY 07-08*
Total Assets:	65,577	67,016	70,535
Liabilities:	5,831	9,761	6,494
Net Assets:	59,746	57,255	64,041

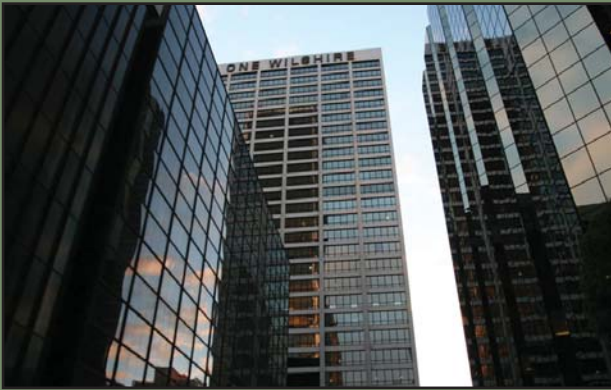## Total Assets, Liabilities, and Net Assets
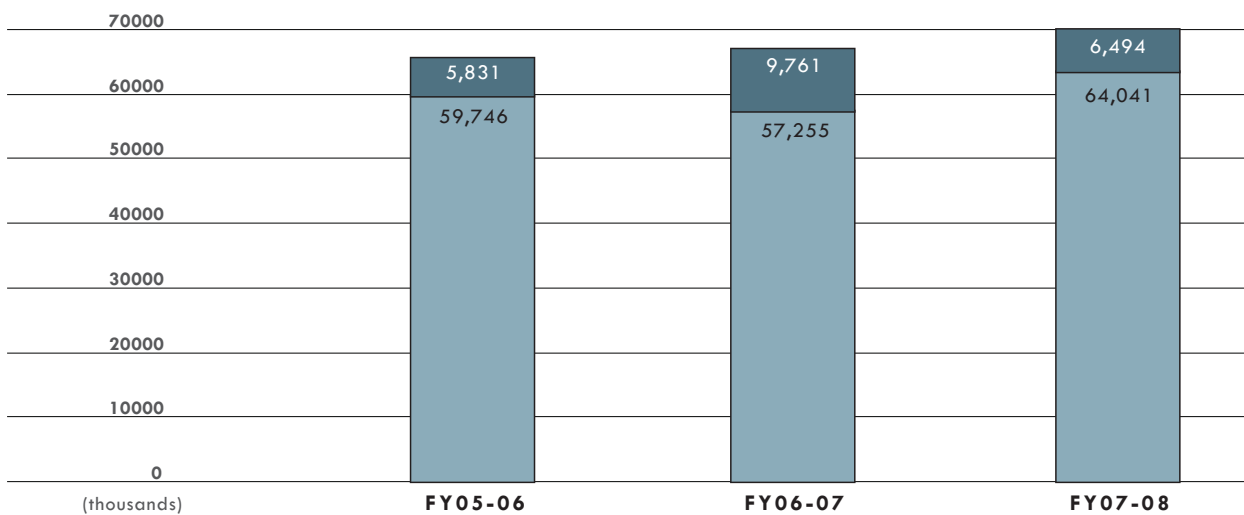
Prudent financial management together with the oversight provided by the CENIC Finance Committee has resulted in CENIC's having a strong balance sheet.

* The audit of financial data for the 2007-08 fiscal year has not yet been completed.

The CalREN Network & Other Services

Pictured from top: One Wilshire Building (Los Angeles, CA), Installation of CalREN Palm Desert backbone node (Palm Desert, CA)

Ten years ago, high-performance networking generally meant a T-3 connection delivering 45 Mb/s straight to a campus or business park. Increasing bandwidth enabled the creation of even more bandwidth-hungry applications, inaugurating a game of leapfrog between applications and the network over which they operate that continues to this day. Now Gigabit connectivity, the gold standard only a few short years ago, has been subsumed by 10 Gig networking, and technologies like wave-division multiplexing are packing ever more data onto fiber-optic cables, promising to push that figure far higher in the future.

Harnessing this revolution and ensuring that California's research and education community continues to play a major role in its creation is the purpose behind the California Research & Education Network, or CalREN. Stretching for 2,700 miles throughout the Golden State and serving 9.5 million Californians every day, CalREN enables the state's entire public education system to collaborate globally on topics like nanotechnology, seismic and deep ocean studies, metagenomics, entertainment and the arts, telemedicine, and educational applications — topics that, in the years to come, will redefine the world and our place in it.

The CalREN Network

The first generation of CalREN operated in the San Francisco and Los Angeles areas over two telecommunications carrier-provided SONET rings connected by what was at the time a high-speed north/south link. The network also featured redundant connections to the Internet2 Abilene backbone, as well as the Department of Energy's ESNet and NevadaNet, serving the Nevada System of Higher Education (at the time, the UCCSN or University and Community College System in Nevada).

Planning for the second generation of CalREN began in 2000, and in January 2003, CENIC began deployment of the nation's first multitiered, statewide optical network infrastructure.

Currently, CalREN consists of some 2,700 miles of owned optical fiber spanning 17 major backbone nodes, over 70 routers, over 80 switches, over 50 optical components, and roughly 300 leased circuits from telecommunications companies to provide high-performance connectivity to public and private K-20 research and education institutions in all 58 counties.

Highlights of CalREN Include:

CalREN operates over owned fiber acquired largely in the aftermath of the technology boom of the late 1990s, when overprovisioning created an abundance of fiber resources. By acquiring this fiber outright at the time, CENIC helped to position California very well for the present and the foreseeable future in terms of broadband networking for the public good.

CalREN serves the entire California public education community as well as a significant number of private and independent universities, all of which are listed in this report. This near-universality enables collaboration and innovation across segmental boundaries as well as state and international ones, greatly extending the reach of California's research and education community. It also strengthens the voice of California's K-20 community and enables that community to take advantage of economies of scale.

CalREN's fiber-based backbone enables the simultaneous operation of three completely independent network tiers to serve daily educational uses, high-performance research, and bleeding-edge network research and development, making it far more than a production network.

CORNING

SACRAMENTO

OAKLAND

SAN FRANCISCO
PALO ALTO

MERCED
SAN JOSE
FRESNO

SOLEDAD

SAN LUIS OBISPO

BAKERSFIELD

LOS ANGELES

TUSTIN

RIVERSIDE

PALM DESERT

SAN DIEGO

EL CENTRO

CalREN Hub Site

Backbone Fiber

2007-08 Network Upgrades

Backbone Upgrades & New Associates

Not only was the Router Refresh part of the CalREN-DC Network Refresh completed, but its completion also created collocation headroom for future network enhancement.

An RFP was issued for the Router Refresh part of the CalREN-HPR Network Refresh, and the HPR Technical Advisory Council and CENIC worked together to evaluate responses.

CENIC management, working with the four public segments, rebid all of CENIC's leased tele-communication circuits, resulting in a new 5-year, $50 million contract by which AT&T will provide up to 250 high-capacity circuits to CalREN. This contract significantly reduces circuit costs for the primary 1 Gigabit circuits deployed and also provides considerably more flexibility than previous contracts.

CENIC also welcomed a new CalREN Associate during the year: Pepperdine University.

Pictured: Pepperdine University West Los Angeles campus (Los Angeles, CA)

Upgrades to California's K-12 System

Ten county offices of education and one branch office now enjoy a 22-fold increase in bandwidth in their respective connections to the CalREN backbone which came with the replacement of their 45 Mb/s DS-3 connections with Gigabit connections. Thirteen others received a 6.5-fold increase in bandwidth when their 155 Mb/s OC-3 connections to the CalREN backbone were replaced with Gigabit connections.

From 45 Mb/s to 1 Gb/s		From 155 Mb/s to 1 Gb/s	
Butte	Santa Cruz	Alameda	San Diego
El Dorado	Solano	Contra Costa	San Francisco
Marin	Sonoma	Fresno	San Joaquin
Merced	Ventura	Imperial	San Mateo
Monterey		Los Angeles COE	Santa Clara
Placer		Riverside	Stanislaus
Riverside Indio		San Bernardino	

2007-08 Network Upgrades

Upgrades to California Community Colleges

A 22-fold increase in bandwidth to the CalREN backbone is also currently enjoyed by six districts serving a total of nearly one third of a million students plus faculty and staff since their connections to the CalREN backbone were upgraded from 45 Mb/s DS-3 to 1 Gb/s, while the Palo Verde College campus received a massive boost when their two T1 connections (1.54 Mb/s) were replaced by a DS-3.

District and/or Campus Name		Students Served:
Coast Community College District	Coastline Community College Golden West College Orange Coast College	60,000
Kern Community College District	Bakersfield College Cerro Coso College Porterville College	26,000
Los Rios Community College District	American River College Cosumnes River College Folsom Lake College Sacramento City College	71,000
Riverside Community College District	Riverside City College Moreno Valley Campus Norco Campus	30,000
San Diego Community College District	San Diego City College Mesa College Miramar College	100,000
San Mateo Community College District	Cañada College College of San Mateo Skyline College	40,000
Palo Verde Community College		3,200

Upgrades to the California State University

The CSU San Bernardino campus received dual, diverse connectivity this year when its OC-3 connection was joined by a 1 Gb/s connection via CENIC-owned fiber to the CalREN backbone.

Cal Poly Pomona also received a new 1 Gb/s CENIC-owned fiber connection to CalREN alongside its original OC-3 connection (which is slated to be replaced by a 1 Gb/s fiber connection in the coming fiscal year to give the campus dual, diverse Gigabit connectivity to CalREN). Finally, the CSU Stanislaus Stockton Center received a massive boost in bandwidth to its CalREN connection when its two T1 connections were replaced with a DS-3.

Upgrades to the University of California

The University of California's State Office of Governmental Relations received new connectivity to the CalREN backbone during the past fiscal year, and a special 10-Gigabit dedicated circuit on CalREN's bleeding-edge eXperimental/Developmental network tier was also provisioned between the UC Davis and UC San Diego campuses to support ultra-high-performance and experimental network research taking place on the two campuses.

Other Upgrades

USC is beginning to use CENIC's commercial ISP services. This is expected to result in cost savings for the university. The first phase of the TransitRail national footprint was completed at the beginning of this fiscal year with the activation of the Chicago, IL node, and new member Mid-Atlantic Crossroads came on board. ThaiREN and Uninet, both located in Thailand, joined the Pacific Wave distributed peering facility as well.

CalREN-DC: Digital California

Designed to support: Day-to-day research and education uses
Backbone speed: 10 Gb/s
Provides connectivity to: Commercial Internet
Projects: Router refresh complete

High-bandwidth networking has gone from luxury to necessity since CENIC's creation. Now, almost all of the applications employed by research and education require it. E-mail and the World Wide Web are used to deliver rich media and complex applications, and high-quality videoconferencing, once a top-tier application, is now required for the day-to-day activities of researchers, faculty, students, and staff.

CalREN-DC is the network over which services like these are delivered. E-mail and access to the World Wide Web are enabled by CalREN-DC's connection to the commercial Internet, and the videoconferencing provided to the CENIC Charter Associates by CalREN Video Services operates over CalREN-DC as well.

Daily administrative tasks are also enabled by CalREN-DC, such as the communications carried out by California's Community Colleges with their off-site centers, and the California State University's connections to its contracted computing facility in Salt Lake City, UT.

With the completion of the recent CalREN-DC Router Refresh Project, the backbone speed of this network tier was increased fourfold from 2.5 Gb/s to 10 Gb/s, and the installation of the new routers will enable CalREN-DC to remain ahead of the curve as network technology advances.

CAHSEE: Stepping into Your Future — 2008 Innovations in Networking Award Winner

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)

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 a statewide initiative, CAHSEE: Stepping into Your Future.

Rudy Rizo (LA USD), Stephanie Couch (CENIC), and Gordon D. Cremer (Butte-Glenn Community College) accepted the award on behalf of CAHSEE: Stepping into Your Future

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.

CalREN-HPR: High-Performance Research

Designed to support: Bandwidth-intensive research applications

Backbone speed: Currently 10 Gb/s, up to 40 Gb/s upon completion of Network Refresh Project

Provides connectivity to: Internet2, NLR PacketNet

Projects: Router and switch refresh to begin in 2008

Researchers have always been prepared to collaborate across boundaries of all kinds, but with the advent of high-performance networking, new types of collaboration have become possible that promise to change the way science in all disciplines is practiced. The Earth is now one laboratory, with top-tier scientific instruments, expertise, and data resources simultaneously accessible to people on all continents — provided a high-performance optical path exists to bring all of them together.

CalREN-HPR is California's contribution to sustaining that worldwide laboratory. The state's major research institutions and laboratories collaborate via CalREN-HPR, including the San Diego Supercomputer Center, the Jet Propulsion Laboratory, the Monterey Bay Aquarium Research Institute, and the University of California Institutes for Science and Innovation: the California Institute for Quantitative Biomedical Research (QB3), the California Institute for Telecommunications and Information Technology (Calit2), the California Nanosystems Institute (CNSI), and the Center for Information Technology in the Interest of Society (CITRIS).

With the completion of the CalREN-DC Refresh Project, the CalREN-HPR Refresh Project is slated to begin. Upon completion of this project, CalREN-HPR will have the ability to support dedicated connections between researchers and the facilities they interact with, increasing the network's value with the ability to ensure that high-performance connectivity is used for the most bandwidth-intensive applications.

Pac-10 Internet Video Exchange — 2008 Innovations in Networking Award Winner

As the NCAA disallows in-person scouting of opponents, each team videotapes its own games and exchanges these video files with the next game's opponents. These videos of athletes' performance are critical to coaching. Prior to the 2005 season, these video exchanges consisted of exchanging physical media delivered via courier services. This process was slow, unreliable and costly for the schools involved.

At a Pac-10 video coordinators' meeting prior to the 2005 football season, Steve Pohl of the University of Oregon suggested looking into exchanging video via high-bandwidth networks such as CalREN. 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: CENIC Associates UCLA, USC, and Stanford, the University of Washington, and a site outside the Pac-10 conference, Notre Dame. These sites interconnected via high-bandwidth links over CalREN and Internet2 using a specially tuned FTP implementation from the French National Particle Physics Institute in Lyon, France.

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 has been an unqualified success.

Ken Norris and Chris Thomas of UCLA accepted the award from UC Santa Cruz's Doug Hartline (CENIC Business Advisory Council Chair)

CalREN-XD: eXperimental/Developmental

Designed to support: Bleeding-edge research
Backbone speed: Unlimited
Provides connectivity to: NLR WaveNet and FrameNet

The most demanding, bleeding-edge research occupies a unique place among the types of research supported by CalREN. Since it oftens pushes the network itself beyond the under-stood edges of today's technology, it could interfere with the functioning of the network for other educators and researchers — or rather, it would, without a separate, independent network tier dedicated to the most advanced, network-intensive research.

CineGrid — 2008 Innovations in Networking Award Winner

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 experience. CineGrid @ Holland Festival 2007 certainly did that and more.

Accepting on behalf of CineGrid was Laurin Herr (Pacific Interface), Tom DeFanti (Calit2@UCSD), Naohisa Ohta (Keio University), and Natalie von Osdol (Pacific Interface). Jim Dolgonas (CENIC) is shown second from left.

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).

CalREN-XD is that network tier, operating entirely independently of the previous production tiers so that the CENIC Associates' faculty, staff, and students can continue to use CalREN-DC and HPR without interruption or degradation of performance, even while elsewhere, network researchers push the network to or even beyond tolerance.

A project-based network tier operated in response to specific bleeding-edge research projects, CalREN-XD supports research at the San Diego Supercomputer Center, the UC Institutes for Science and Innovations listed previously, the Jet Propulsion Laboratory, Caltech's Center for Advanced Computing Research, the University of Southern California and its Information Sciences Institute, Stanford University and the Stanford Linear Accelerator Center, and other major research entities.

UltraLight — 2008 Innovations in Networking Award Winner

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 2007 SuperComputing conference held last November in Reno, NV, seven individual 10-Gigabit fiber paths (six provided by CENIC and one by Internet2) were used to move vast files of scientific data at blinding transfer rates of 80 Gigabits per second of bi-directional transfer.

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.

Accepting on behalf of the UltraLight project was Julian Bunn (California Institute of Technology, center) with Jim Dolgonas (CENIC, left) and Doug Hartline (UCSC, right)

The CENIC Network Operations Center

CENIC's Network Operations Center or NOC functions as the primary point of contact for network issues within CalREN and support for the CENIC Associates. All three tiers of CalREN are supported and monitored 24/7/365 by the engineers in the NOC. This support includes such tasks as responding to abuse complaints and managing customer interactions related to service interruptions, as well as planning maintenance events across the entire CalREN network.

Additionally, the technical functions performed by the CENIC NOC go well beyond customer interactions and include the management of the optical (Layer 1), Ethernet (Layer 2), and routing (Layer 3) components of the three tiers of CalREN, as well as Layer 1 (optronics) support for National LambdaRail and network engineering support for peering networks TransitRail, PacificWave, and CIIX. The Network Engineers of the NOC also provide support for circuit installations and equipment upgrades, of which there have been a significant number during the 2007-08 fiscal year, as well as diagnosing and resolving equipment failures.

Over the 2007-08 fiscal year, the CENIC NOC has responded with professionalism, skill, and efficiency to 10,421 calls, which have resulted in 7,835 tickets tracking communications and troubleshooting. Beginning in February 2005, feedback has been solicited from the CENIC Associates by way of the Networking Operations Center Service Interaction survey. A link to the survey is included in e-mail correspondence between the NOC and its customers upon resolution of each request for assistance. Since its inception, 328 responses have been collected, 104 of which were received during the 2007-08 fiscal year.

In those 104 responses, customers indicated a high level of satisfaction as expressed by agreement with the following statements:

"When I contacted the CENIC Network Operations Center ... "	% Agreement
"The response time for my initial request for support was faster than or met my expectations."	96%
"Communications providing the status of my request for support were timely."	97%
"The time to resolution for my support request was faster than or met my expectations."	95%
"I am satisfied or very satisfied with the CENIC NOC's handling of my request for support."	97%
"The CENIC NOC representative I worked with understood my problem."	100%
" ... handled my problem with an appropriate level of urgency."	98%
" ... followed through with requested information."	99%
" ... confirmed that I was satisfied with the resolution."	99%

More information about the CENIC Network Operations Center can be found at noc.cenic.org.

CalREN Video Services

High-performance networks such as CalREN perform the vital function of giving researchers and educators in California access to tangible resources, including data centers, grid networks, ocean observatories, and remote telescopes. An equally vital benefit is the role high-performance networks play in connecting people to one another in virtual communities, which CENIC accomplishes by means of CalREN Video Services.

CalREN Video Services (CVS) facilitates the development and success of virtual communities by offering high-quality videoconferencing to over 150 K-20 sites throughout California. Via its seamless connection to the Internet2 Commons, CVS also makes it easy for California sites to schedule videoconferences with K-20 sites throughout the United States and internationally.

CVS operates a videoconferencing infrastructure consisting of multipoint control units (MCUs), a conference scheduling system, gatekeeper and proxy devices, and 24/7 management and support of scheduled videoconferences. Through the online CVS Scheduling Desk, the Videoconference Administrators (VAs) at each CVS site can schedule and manage their own videoconferences. They can modify conferences, including those already in progress, and send notifications of scheduled videoconferences to other VAs and participants.

To learn more about participating in CVS as a certified CVS site, please contact CENIC via e-mail to SchedDesk@cenic.org. Additional information about CVS can be found at cvs.cenic.org.

During the past fiscal year, 3,664 scheduled videoconferences were held using the CVS Scheduling Desk, representing approximately 27,200 hours of videoconference activity. Yearly peak scheduled usage continues to occur at mid-semester times (April and October).

Administrative use of videoconferencing technology is on the rise, yet academic use remains dominant. 86% of the total conferences held in 2007-08 were academic conferences. There is strong anecdotal evidence that the number and percent of academic conferences held would be significantly higher if point-to-point conferences, which are conducted directly between two sites, were included in our statistics. However, because these conferences are not scheduled through the CVS Scheduling Desk, our statistics do not include them.

Total Intersegmental Videoconferences by Month
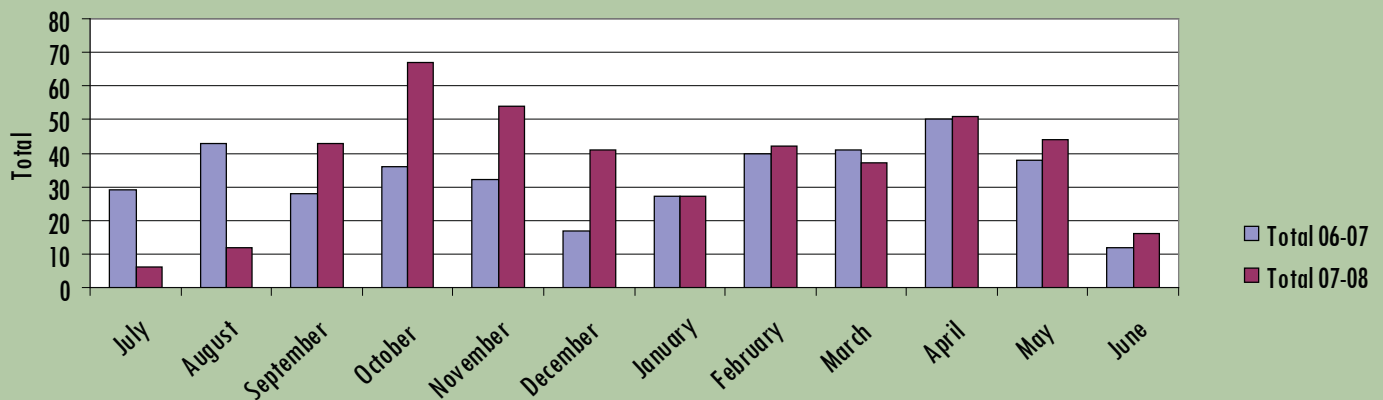
The most notable change in usage in 2007-08 was the increase in intersegmental videoconferences. These conferences involve two or more of the following institutions: CCC, CSU, K-12, and UC. Intersegmental conferences are up 12% from 2006-07 as shown in the chart below. Through facilitating cross-segmental collaboration, CVS continues to be an excellent tool by which California's K-20 community can leverage their expertise across all segments.

CVS activities for 2008-09 include development of a comprehensive equipment and software refresh plan that recognizes the role of new technologies such as high-definition videoconferencing (HD) and telepresence, and the interest in additional services, such as webcasting, video archiving, and on-demand video streaming.

Beyond California: Peering Services

The vision of California's K-20 research and education community extends worldwide, and the network that supports them must do the same. In addition to its relationships with the Internet2 and National LambdaRail backbones, CalREN achieves this through the national and international network exchanges TransitRail and Pacific Wave.

Through these facilities, both joint projects between CENIC and the Pacific Northwest Gigapop (PNWGP), research and education networks and organizations around the world connect to one another for mutual benefit, enabling high-performance network paths that span the globe.

Thanks to such global-scale cutting-edge networking, educators employ high-quality videoconferencing and other networked teaching tools to empower not only distance learning but fully integrated classrooms. Earth-sized computers become possible with fiber-optic-based "virtual backplanes," and globe-girdling experiments integrating instruments, data resources, and researchers on multiple separate continents enable not just revolutionary ways to carry out mainstream science, but entirely new forms of science as well.

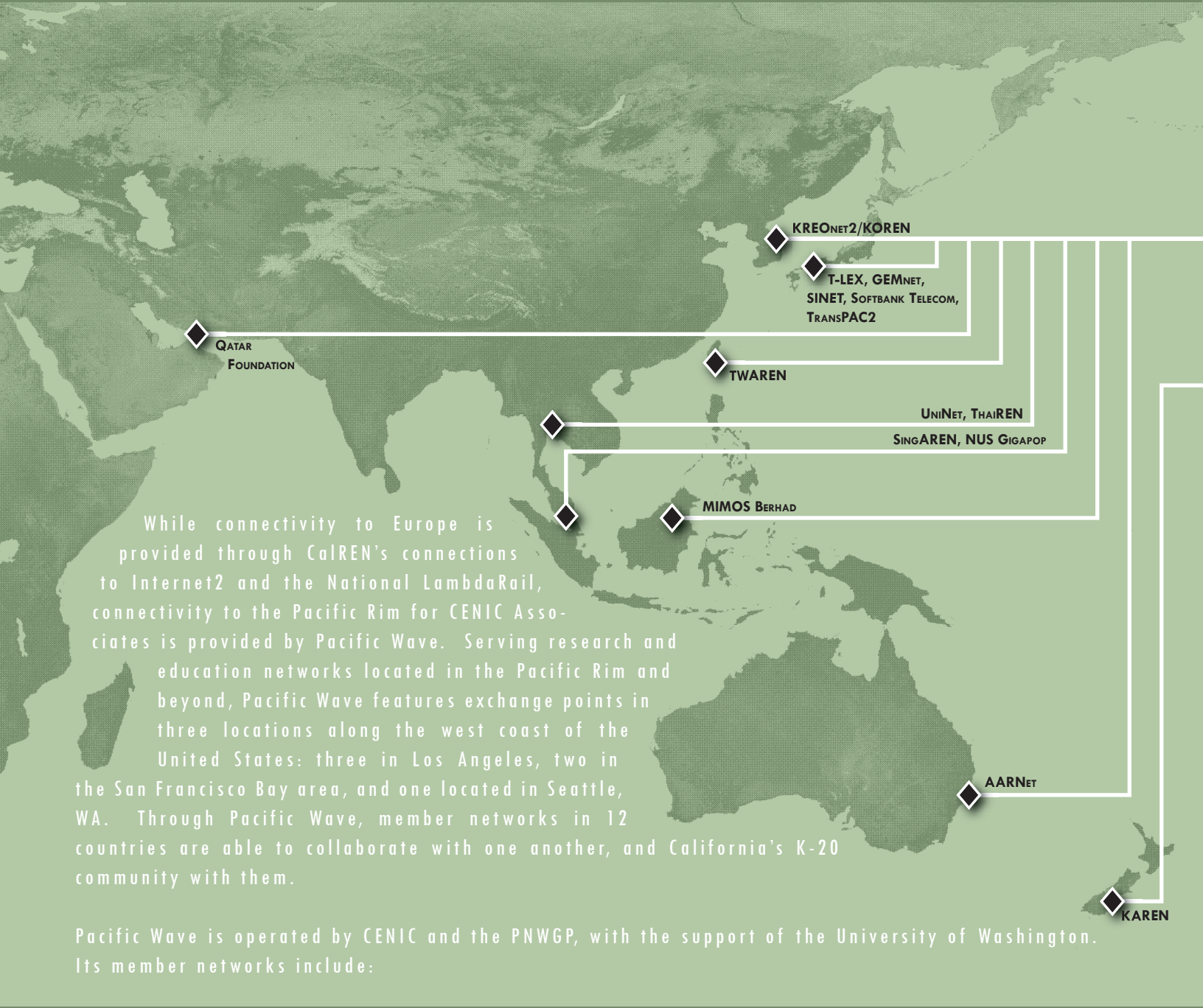## TransitRail Distributed National Peering Facility • www.transitrail.net
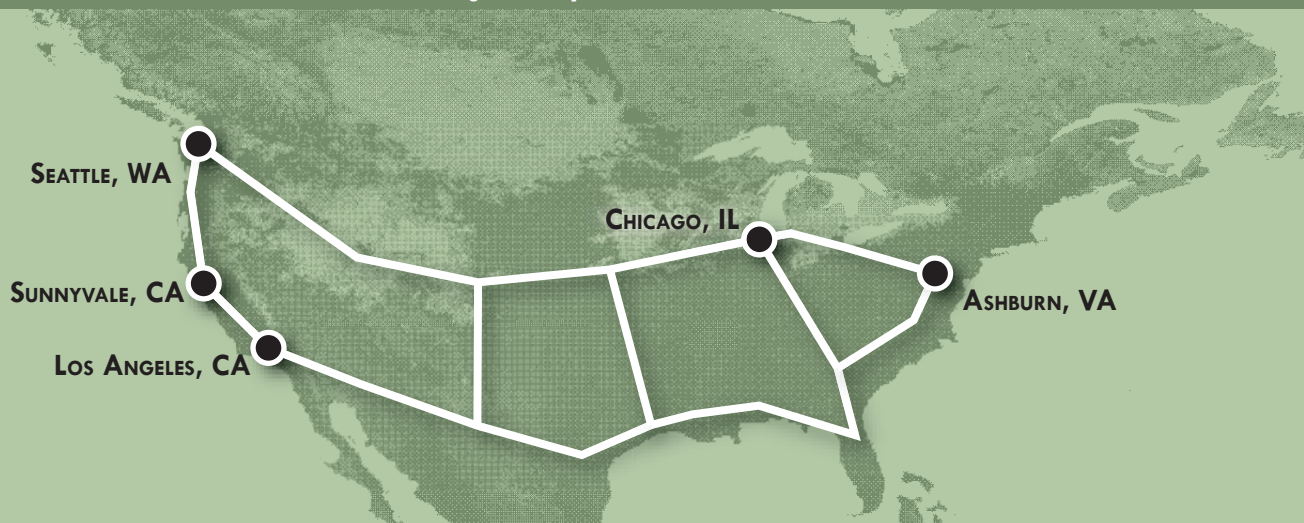
CENIC and the Pacific Northwest Gigapop implemented and currently operate the TransitRail national distributed peering facility, which uses the transport and services of National LambdaRail for both its backbone infrastructure and subscriber access. With five exchange points widely spaced across the United States, TransitRail enables its members to leverage their membership in National LambdaRail to offer substantial cost savings and improved performance to their network users.

TransitRail exchange points are located in Los Angeles and Palo Alto, CA; Chicago, IL; Ashburn, VA; and Seattle, WA, with the Chicago node coming online at the beginning of the 2007-08 fiscal year. Current participants include CENIC, Education Networks of America, Florida LambdaRail, Front Range Gigapop, Lonestar Education and Research Network, Louisiana Optical Network Initiative, MidAtlantic Terascale Partnership, Mid-Atlantic Crossroads, OneNet, Pacific Northwest Gigapop, Pittsburgh Supercomputing Center, and Southern Crossroads.
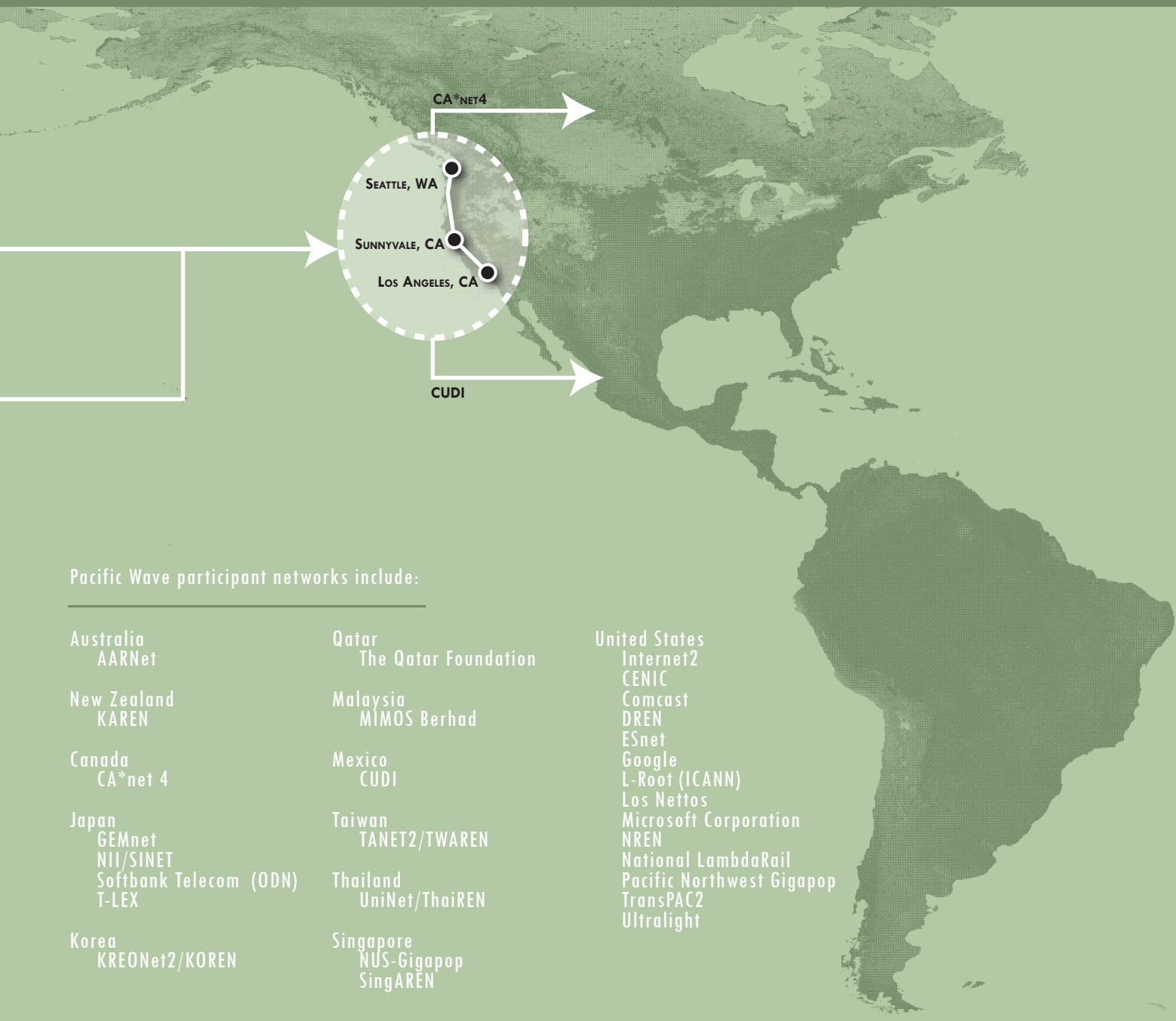
Pacific Wave International Distributed National Peering Facility • www.pacificwave.net

KREONET2/KOREN

T-LEX, GEMNET, SINET, SOFTBANK TELECOM, TRANSPAC2

QATAR FOUNDATION

TWAREN

UNINET, THAIREN

SINGAREN, NUS GIGAPOP

MIMOS BERHAD

AARNET

KAREN

While connectivity to Europe is provided through CalREN's connections to Internet2 and the National LambdaRail, connectivity to the Pacific Rim for CENIC Associates is provided by Pacific Wave. Serving research and education networks located in the Pacific Rim and beyond, Pacific Wave features exchange points in three locations along the west coast of the United States: three in Los Angeles, two in the San Francisco Bay area, and one located in Seattle, WA. Through Pacific Wave, member networks in 12 countries are able to collaborate with one another, and California's K-20 community with them.

Pacific Wave is operated by CENIC and the PNWGP, with the support of the University of Washington. Its member networks include:

CA*net4 →

SEATTLE, WA ●

SUNNYVALE, CA ●

LOS ANGELES, CA ●

CUDI →

Pacific Wave participant networks include:

Australia	Qatar	United States
AARNet	The Qatar Foundation	Internet2
		CENIC
New Zealand	Malaysia	Comcast
KAREN	MIMOS Berhad	DREN
		ESnet
Canada	Mexico	Google
CA*net 4	CUDI	L-Root (ICANN)
		Los Nettos
Japan	Taiwan	Microsoft Corporation
GEMnet	TANET2/TWAREN	NREN
NII/SINET		National LambdaRail
Softbank Telecom (ODN)	Thailand	Pacific Northwest Gigapop
T-LEX	UniNet/ThaiREN	TransPAC2
		Ultralight
Korea	Singapore	
KREONet2/KOREN	NUS-Gigapop	
	SingAREN	

2007-08 CENIC Outreach

Pictured: Oakland, CA skyline at night — Site of the CENIC 2008 Annual Conference, Lightpath to the Stars

As an organization that serves the entirety of California's public education system and a significant number of its private and independent research & education institutions, CENIC is in a unique position both to communicate that community's networking-related accomplishments to the world at large, and to draw its various segments together for the mutual benefit of all.

In order to accomplish this, CENIC engages in outreach activities that seek to enable the achievements of the institutions it was created to serve and to highlight these achievements as a means of enhancing their global reputations.

CENIC participates in events that serve the various segments of California's research and education community, creates specific events to celebrate achievements by particular schools, colleges, and universities, and also holds an Annual Conference bringing the community's members together for their mutual benefit.

CENIC Enables Super Network for Supercomputing 07

For five days in November 2007, the Reno-Sparks Convention Center in Reno, NV hosted some of the world's most cutting-edge network-based experiments and demonstrations as part of this year's SuperComputing conference, SC07. In order to make all this possible, a network that pushes beyond the boundaries of what is possible and yet performs with rock-solid reliability must be constructed -- the all-volunteer effort to create what is known as SCinet. Over a hundred volunteers from industry, government, and the research and education community created a network at the Reno-Sparks Convention center composed of multiple 1, 10, and 40 Gb/s connections and which delivered more than 200 Gb/s to the show floor.

A significant part of the effort to build the SCinet network was spearheaded by the SCinet Wide-Area Network Transport Group (WTG), responsible for the 27 circuits worth of WAN connectivity that made up the bandwidth used by the presenters and attendees — and CENIC Core Engineer Chris Costa and Project Manager Edwin Smith were tapped to function as WTG co-chairs.

Their jobs began almost immediately after being tapped for the position when the WTG visited the Reno-Sparks Convention Center to determine what would be needed to transform the building's networking and enable it to deliver a fifth of a Terabit per second to some of the world's most advanced researchers and vendors. Extensive testing followed, and then the final phase of show staging.

Equipment to provide eleven optical waves was contributed from a partnership between CENIC, National LambdaRail (NLR), the Nevada System of Higher Education, and Cisco Systems, comprising

Pictured: Network engineers responsible for the creation of the high-performance SCinet network for Supercomputing 07

ten 10 Gb/s circuits deployed over the CalREN optical backbone to provide a 100 Gb/s of bandwidth to the convention center show floor. CENIC, as the NLR Layer 1 engineering group, also deployed and reengineered 10 Gb/s waves from Seattle to Sunnyvale and from Los Angeles to Sunnyvale in order to support NLR's PacketNet and FrameNet connections to the SCinet network.

The resulting network enabled researchers from UCLA, Caltech, Calit2/SDSC, SDSC/TeraGrid, and NASA Ames to conduct impressive high-bandwidth demonstrations.

*Pictured: Ed Smith (CENIC Project Manager)
and Chris Costa (CENIC Core Engineer)*

The Pacific Wave international peering facility also played a major part in providing bandwidth to SCinet. To support the interests of Pacific Wave members' participation in SC07, dedicated 10 Gb/s capacity was deployed across the Pacific Wave exchange from Seattle to Sunnyvale and from Los Angeles to Sunnyvale, and the exchange was extended via 10 Gigabit Ethernet from the Sunnyvale POP in order to reach the convention center. Caltech, the NASA Research and Education Network (NREN), the Korean research and education network KREONet, the Asia-Pacific network TransPAC2, and the University of Washington/Research Channel all participated in SC07 via this connectivity.

UC Santa Cruz: Fiber to the Future

On January 24, 2008, representatives from UC Santa Cruz, the UC Office of the President, the Santa Cruz County Office of Education, and state and local elected officials gathered to celebrate the kickoff of a project to connect the UC Santa Cruz campus to CalREN via CENIC-installed and operated dark fiber, providing greatly increased performance and bandwidth and adding a direct, dedicated connection to the campus's Silicon Valley Center located at NASA's Ames Research Center.

From UC Santa Cruz, speakers included Larry Merkley, the departing Vice Provost of Information Technology and Chancellor George Blumenthal (shown below), both significant forces in moving the project forward. CENIC President and CEO Jim Dolgonas spoke on behalf of CENIC, and then-UC Associate Vice President and CIO Kristine Hafner spoke of the importance of the project to the UC system as a whole. Field representatives for State Senators Joe Simitian (Sen. District 11) and Abel Maldonado (Sen. District 15) as well as State Assembly Member John Laird (Assy. District 27) attended as well.

To address the benefits to research, UC Santa Cruz faculty members Stan Woosley, Professor of Astronomy and Margaret Morse, Acting Dean of the Arts took part in the event as well, presenting on their respective disciplines and how they will benefit from the increased bandwidth that will be available to UC Santa Cruz during the next fiscal year.

Pictured from left: UC Santa Cruz campus (Santa Cruz, CA), UC Santa Cruz Chancellor George Blumenthal speaking at"Fiber to the Future"

The increased bandwidth and robustness of the new connectivity benefits not only UC Santa Cruz's research but statewide education programs as well, such as the UC College Prep program, which delivers not only text-based course content but videoconferencing and rich media in order to empower students in traditionally underserved communities to prepare for college eligibility.

With the 2009 completion of the "dark fiber" project the kickoff of which was celebrated, UC Santa Cruz will enjoy an extremely high-bandwidth, robust, completely CENIC-managed connection to the CalREN backbone node located at San Jose/Sunnyvale — a connection which multiplies the bandwidth of the previous connection by ten and also provides a direct, dedicated Gigabit connection to their Silicon Valley Center located at the NASA Ames Research Center. As home to some of the most illustrious research institutes and centers in the scientific community, UC Santa Cruz and the community of faculty, students, and staff served by it stand to benefit tremendously from this increased connectivity. California's K-12 students also stand to benefit from UC Santa Cruz's central role in the UC College Prep program, which develops and distributes high-quality courses and course content to benefit California students, with a special emphasis on helping underserved students prepare for college eligibility. Both innovative research and education at this level require high-bandwidth connectivity to speed collaboration and the exchange of information and rich media.

CENIC 08: Lightpath to the Stars

The CENIC Annual Conference, CENIC 2008: Lightpath to the Stars, was held from March 10-12, 2008 in Oakland, CA. Attendees gathered for presentations showcasing achievements in research and education in a wide range of disciplines, and demonstrating the varied uses of CalREN. Lightpath to the Stars featured presentations, keynote addresses, demos, and CENIC's annual Innovations in Networking Awards for 2008, highlighted throughout this report.

Planning is already underway for CENIC's next Annual Conference, RIDING THE WAVES OF INNOVATION, which will take place March 9-11, 2009 in Long Beach, CA.

Pictured from left: UC Berkeley's Geoff Marcy speaking to attendees at CENIC 08: Lightpath to the Stars

The 2008 conference program featured presentations and panel discussions with breakout sessions devoted to Teaching and Learning applications and Technology and Research topics. In addition, there were demonstrations of ways the network is being utilized, and distinguished keynote speakers (listed on the following pages).

CANARIE's Bill St. Arnaud spoke live from Canada via videoconference on the ways in which universities and high-performance networks such as CalREN can contribute to the reduction of global warming. Planet-hunting luminaries Geoffrey Marcy and Robert Kibrick of UC

Berkeley addressed the ways in which high-performance networking supports efforts to find new planets and facilitates remote observing methods. A series of short presentations gave attendees insight into various facets of IPv6 deployment. And a diverse group of K-20 educators from the CSU Center for Distributed Learning, Exploratorium, Lewis Center, NASA Ames Research Center, Stanford University, and UCLA underscored the importance of having CalREN to deliver high quality educational programs.

During the demonstration session, attendees were shown real world examples of the types of work made possible by CalREN and other research and education networks. UCLA's Joan Slottow, the Exploratorium's Sherry Hsi, and San Diego State University's Eric Frost shared their respective achievements in grid computing, media-enriched teaching and learning, and emergency response systems.

Select presentations and all keynote addresses are available in MP4 format for download at the conference website, cenic08.cenic.org.

Lightpath to the Stars was made possible with the generous support of Cisco Systems, AT&T, GigaFin Networks, Qwest, Juniper Networks, Level(3) Communications, and Verizon. Video recording of select presentations was performed by NCast Corporation.

California Public Utilities Commissioner Rachelle Chong delivered a Keynote Address entitled "Building Tomorrow's California: Broadband Highways and Environmental Leadership."

In her address, Commissioner Chong considered the utility of government regulation in promoting broadband, where the market can be trusted to provide adequate penetration, and where government regulation is needed, and the broad array of economic and social benefits, both current and projected, to the state thanks to broadband deployment, availability, and adoption.

The Keynote Address by Dan Bursch, Naval Postgraduate School National Reconnaissance Office chair and former NASA Astronaut, was enhanced with many beautiful, high-resolution photographs and was titled "Expedition Four to the International Space Station: Collaboration off the planet."

He examined the technological and psychological aspects of collaborating across distances normally not spanned by fiber-optic cable, using examples from his own experiences on the Space Shuttle and his tenure on board the International Space Station.

Keynote Speaker Sandra Faber, professor of astronomy and astrophysics at UC Santa Cruz, spoke on the topic "Piping the Light of the Cosmos Through Dark Fiber." She explained the vast quantity of data (by her projections, soon to equal an Exabyte) generated by professional and amateur astronomy, explored the problems associated with analyzing the data, and suggested ways in which high-performance networking can mitigate these problems. She shared some of the most advanced simulations of galactic formation, galactic collisions, and planetary behavior to date, all of which would be unwieldy without the benefit of cutting-edge networks due to their size and the processing required to generate them.

Other Outreach Activities

In November 2006, Governor Schwarzenegger took a significant step in assuring that California will be well equipped to meet the challenges of the 21st century with Executive Order S-23-06, Twenty-First Century Government: Expanding Broadband Access and Usage in California, which focused on ways to increase broadband deployment, availability, and adoption, and ways to cost-effectively speed all three.

Pictured above: State Capitol (Sacramento, CA), CENIC Director of Statewide Initiatives Stephanie Couch

To this end, the Order called for the establishment of a California Broadband Task Force, consisting of 21 of the most accomplished movers and shakers in the state in the area of broadband networking. Among this task force were three members of the CENIC community: President Rollin Richman of Humboldt State University; Larry Smarr, Director of Calit2 and CENIC Board member; and Stephanie Couch, CENIC's Director of Statewide Initiatives.

For over a year, the Task Force examined California's broadband health, with particular care given to education, healthcare, community-based organizations, and government. On January 17, 2008, the final report was published, The State of Connectivity: Building Innovation Through Broadband, and CENIC is proud to have played a major role in its creation. Its exhaustive detail and sound advice, generated by some of the best minds in the world in the arena of broadband networking, will be of immense value to all stakeholders in California and beyond.

Governor Schwarzenegger's California Broadband Task Force — 2008 Innovations in Networking Award Winner

In the past decade, 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 these networking needs across the state.

Governor Arnold Schwarzenegger 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. The California Broadband Task Force, convened and led by Secretary of Business, Transportation, and Housing Dale Bonner, 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 to enable the creation and deployment of new advanced communication technologies. Obtaining an accurate snapshot of areas in the state that lack adequate access to broadband services is one of many valuable outcomes of the Task Force.

*California Broadband Initiative Manager Anne Neville accepted the award from Doug Hartline*

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

CETPA Conference Sees CENIC and K12HSN in Indian Wells, CA

The 47th Annual California Educational Technology Professionals Association (CETPA) Conference took place from October 9-12 at the Renaissance Esmeralda Resort & Spa in Indian Wells, CA, and CENIC and the K12 High-Speed Network (K12HSN) were both represented at a shared booth staffed by personnel from both organizations. Attendance at the event gave both organizations an opportunity to interact with existing and prospective users of the CalREN-DC network.
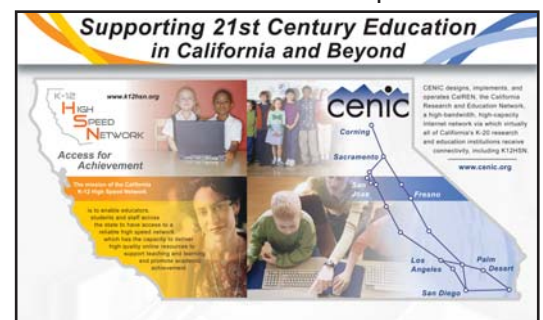
CETPA is the California Educational Technology Professionals Association, whose member-ship is made up largely of technology professionals in the K-12 educational segment includ-ing Directors of Technology, Chief Technology Officers, Network Managers and Network Administrators, and related positions.

CENIC at 2008 Conference of CCC Chief Information Systems Officers

From March 16-19, 2008, the California Community College System held its annual conference of the CISOA/RP (Chief Information Systems Officers Association/Research & Planning Group) in Monterey.

Pictured above: Catherine McKenzie (CCC System Office) at CISOA conference in Monterey, CA

CENIC's Project Manager Ed Smith par-ticipated with a booth in the vendor display area and presented on planned improvements in community college connectivity to CalREN in a break-out session along with Catherine McKenzie from the CCC System Office (shown above) and Deborah Ludford from the North Orange County Community College District. During the 2007-08 fiscal year, Ms. Ludford was Vice-Chair of CENIC's DC Technical Advisory Council (DC-TAC) and will assume the position of Chair of the DC-TAC next fiscal year.

CENIC President and CEO Jim Dolgonas also attended the conference and gave an update on current and upcoming CENIC activities.
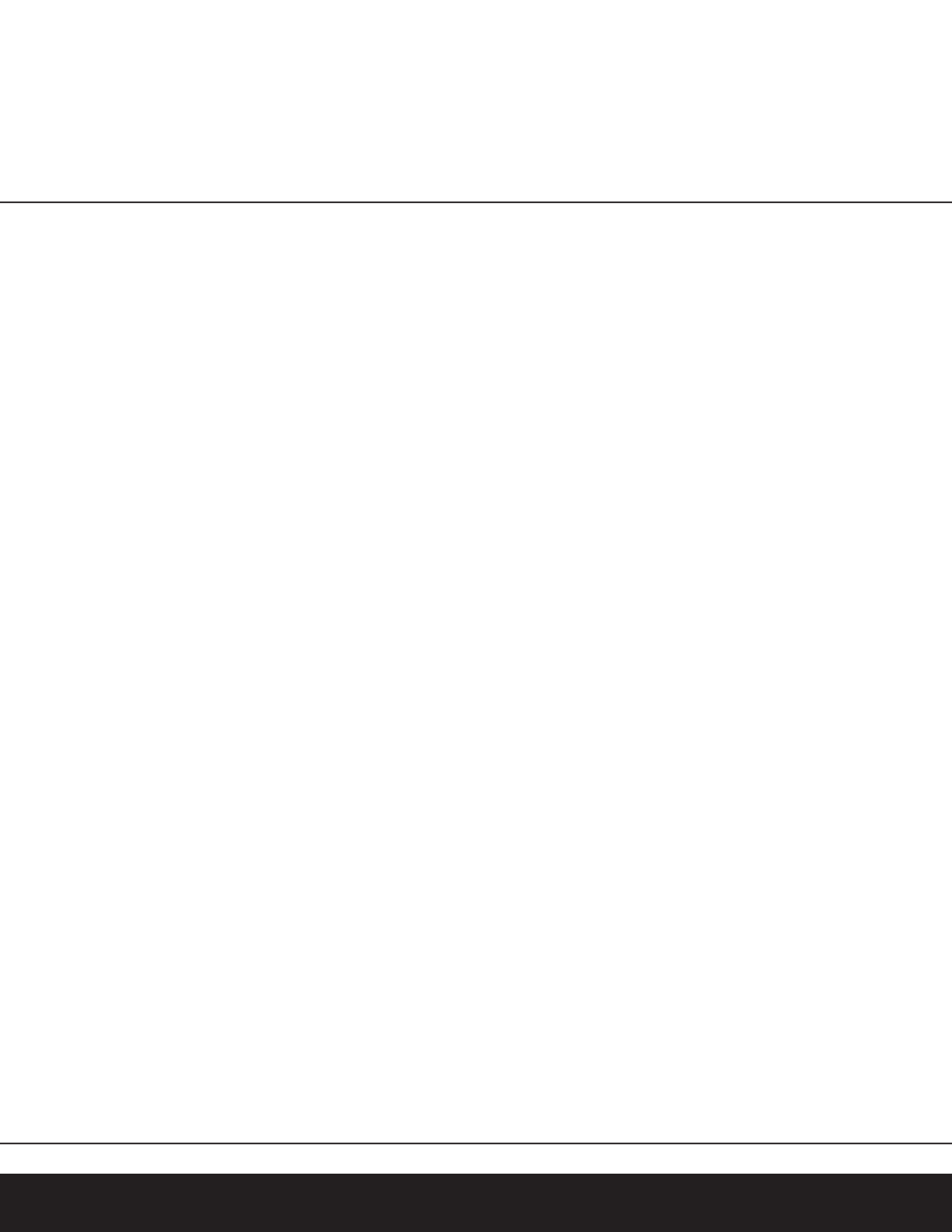
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