The Corporation for Education Network Initiatives in California

2008-09 Annual Report

Letter from the President

Jim Dolgonas
President & CEO

The 2008-09 fiscal year has been profoundly marked by challenges to the California research & education community in three crucial areas: cost, carbon, and convenience. In the 2008-09 Annual Report, I'm very happy to share with you a showcase of just how CENIC and the advanced networking services it was created to provide are playing an increasingly vital role in the research & education community's response to today's challenges in all three areas.

Chief among these is of course, cost. The community that CENIC serves relies on us to meet the needs of the Golden State's nearly ten million faculty, staff, and students and those of neighboring states we serve, while operating within increasingly narrow financial constraints. More and more, that community turns to advanced networks to leverage resources and innovations, ensuring that as many of its members gain benefit from them as possible. High-quality videoconferencing like that provided by CalREN Video Services has extended the reach of a single classroom far beyond traditional boundaries, serving whole populations once considered on the wrong side of the "digital divide" and enabling as many people as possible to benefit from resources located at an individual institution. Driven by advanced networking, revolutionary new collaborations have enabled member institutions to come together and increase their effectiveness while serving industries eager to recruit new members and keep their existing worker population up-to-date as cost-effectively as possible.

The reduction of carbon footprint is another area of challenge, in California and beyond, in which CENIC is proud to play a vital role. The synthesis of virtual classrooms, laboratories, computers, and collaborations is one of the greatest areas of potential for high-bandwidth networks like CalREN, and the cost and carbon savings for such innovations is tremendous. Such synthesis can save on travel, reducing budgets and greenhouse gas emissions, and empower advances like green data storage and processing centers that can be designed and made available state- and worldwide through optical networks. Further, understanding and hopefully even offsetting the effects of climate change requires global science powered by high-bandwidth networking.

The third area of challenge is convenience. In today's world, cost and carbon must be more and more carefully budgeted, but the most valuable commodity of all is, as always, time. Many CENIC Associates are today asked to do more with fewer resources, and the advanced networking services provided via CalREN give faculty and staff the ability to touch more lives than ever, even as their own work lives become more and more demanding. High-quality videoconferencing is once again a "killer app" for saving dollars, greenhouse gases, and time not only in the classroom but for administrative purposes as well, and leveraging resources across optical networks prevents inefficient duplication of effort.

Throughout this Report, you'll see stories of how the CENIC community is achieving all of these things by taking advantage of everything that high-bandwidth networking has to offer. And as always, the CENIC community and CENIC itself are revealed as one and the same. Not only individual institutions or segments benefit from the dedication and expertise that you all so generously share, but the state, nation, and the world do as well. I would like to thank the CENIC Board of Directors, the chairs and members of our committees and councils, our corporate partners, and of course our staff for giving all CENIC members, those in California and outside, the tools needed to meet these challenges and, I'm sure, exceed the catalogue of accomplishments you are now reading in the years to come. I'm certain that this community's greatest achievement will be how we came together to prevail over these challenges and moved forward with confidence into an even greater future.

Table of Contents

Mission College • Santa Clara, CA

San Francisco State University

UC Berkeley

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.

Board of Directors for 2008-09

2008-09 Committees & Councils

Chair, Business Advisory Council

Doug Hartline

Director, Core Technologies

Information Technology Services

UC Santa Cruz

Chair, DC Network Technical Advisory Council

Deborah Ludford

District Director, Information Services

North Orange County Community College District

Chair, HPR Network Technical Advisory Council

Ken Lindahl (before 1/1/2009)

Information Services and Technology, Infrastructure
  Services

UC Berkeley

Rodger Hess (after 1/1/2009)

Network Architect, Communications Resources

UC Davis

Audit Committee

Catherine McKenzie, Chair

Doug Hartline

Mark Crase

  California State University

Todd Finnell

Fred Sherman

Finance Committee

John Charles, Chair

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Elazar Harel

Patrick Perry

Sam Steinhardt

  Stanford University

Trevor Stewart

  Butte Community College
  District

Jim Dolgonas ◆ *Ex Officio*

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John Silvester

Larry Smarr

Ron Johnson

Christine Cermak

  Naval Postgraduate School

Ken Lindahl

Jim Davis, UCLA

Greg Hidley

  UC San Diego

Tom Hutton

  UC San Diego

Tom DeFanti

  UC San Diego

Rodger Hess

Russ Hobby

  UC Davis

Pete Siegel

  UC Davis

Dave Reese*

  CENIC

Jim Dolgonas* ◆ *Ex Officio*

* Non-voting member

The **CENIC Core Values** describe the standards by which CENIC and its employees should 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.

2008-09 CENIC Associates

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
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

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
    Office
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

California's Community Colleges

Chancellor's Office
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

Diamond Ranch High School · Pomona, CA

Sonoma State University · Rohnert Park, CA

College of the Canyons · Valencia, CA

The Naval Postgraduate School · Monterey, CA

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
Taft
Ventura
Victor Valley
West Hills College Coalinga
West Hills College Lemoore
West Los Angeles
West Valley
Woodland
Yuba

2008-09 CENIC Associates

California State University

Chancellor's Office	CSU East Bay	CSU Stanislaus
California Maritime Academy	CSU Fresno	Humboldt State University
California State Polytechnic University, San Luis Obispo	CSU Fullerton	Moss Landing Marine Laboratories
California State Polytechnic University, Pomona	CSU Long Beach	San Diego State University
	CSU Los Angeles	San Francisco State University
CSU Bakersfield	CSU Monterey Bay	San Jose State University
CSU Channel Islands	CSU Northridge	Sonoma State University
CSU Chico	CSU Sacramento	
CSU Dominguez Hills	CSU San Bernardino	
	CSU San Marcos	

University of California

Office of the President	UC Davis	UC San Diego
Office of State Governmental Relations	UC Irvine	UC San Francisco
UC Berkeley	UC Los Angeles	UC Santa Barbara
Lawrence Berkeley National Laboratory	UC Merced	UC Santa Cruz
	UC Riverside	

California Private Universities

California Institute of Technology Jet Propulsion Laboratory	Stanford University Hopkins Marine Station Stanford Linear Accelerator Center Stanford Medical Center	University of Southern California Health Sciences Campus Information Sciences Institute

CalREN Associates

The Naval Postgraduate School
The Nevada System of Higher
   Education
University of Arizona
Arizona State University
NASA Ames Research Center
Monterey Bay Aquarium Research
   Institute
Pepperdine University, West Los
Angeles Graduate Campus
University of San Diego
University of San Francisco
The Wharton School of the University
   of Pennsylvania, Wharton West
   Campus
National University
Chapman University

CENIC Professional 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, which formed the Broadband Pricing Group (BPG) with CENIC as an active participant. The goals of the BPG are to provide all research and education institutions with cost-efficient bandwidth, and to 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, now Internet2, and EDUCAUSE.

CENIC Professional 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.

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.

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 CENIC and the Pacific Northwest Gigapop, among others.

Working with its members and Affiliates, IEEAF works to obtain donated assets or right to use such assets, including communications infrastructure, colocation facilities, or services. These donated assets are made available to qualified not-for-profit "Asset Stewards" to place them into useful service for the research and education community.

2008-09 Financial Statement

	FY 06-07	FY 07-08	FY 08-09
Total Assets:	67,016	70,535	77,267
Liabilities:	9,761	6,494	11,821
Net Assets:	57,255	64,041	65,446

Total Assets, Liabilities, and Net Assets

(thousands)	FY06-07	FY07-08	FY08-09
	9,761	6,494	11,821
	57,255	64,041	65,446
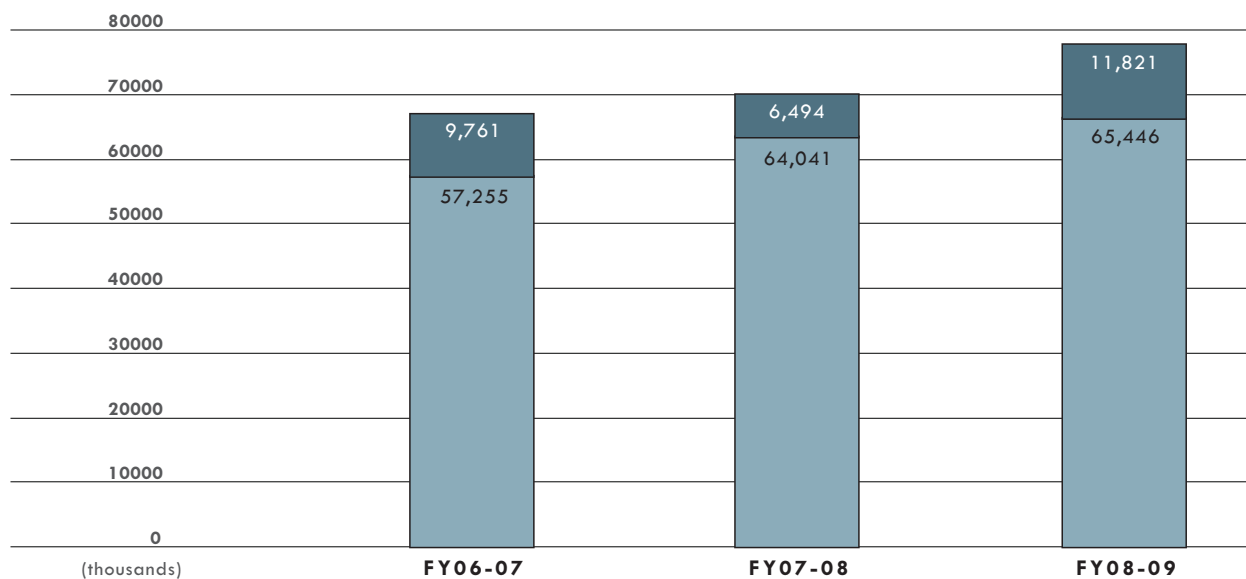
CalREN: Past, Present, and Future
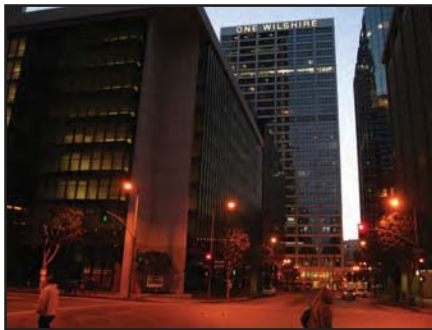
From the top: Installation of the Coachella backbone node of the CalREN network, located at the CSU San Bernardino Palm Desert Campus, and the One Wilshire Building, main point of connection to the Internet for the entire Pacific Rim and the most networked building in the world

California has two Internets.

The first is familiar to everyone, used by millions of people every day to surf the Web, stay in contact with friends and family, entertain themselves and share the fruits of their own creative inspiration, and conduct business.

The second — the California Research & Education Network (CalREN) — is composed of nearly three thousand miles of high-bandwidth fiber-optic cable stretching throughout America's most populous state along with hundreds of leased circuits and state-of-the-art optical/electronic components, and serves the exclusive needs of the Golden State's K-20 research and education community. From kindergarten to post-graduate school and beyond, CalREN empowers innovations in all areas of research as well as creative teaching and learning solutions that can extend the reach of today's education professionals into realms previously considered science fiction.

Owning, designing, deploying, and maintaining this network on behalf of this community is CENIC, the Corporation for Education Network Initiatives in California. Created in 1997 by this community so that it, and by extension all of California and beyond, might enjoy the benefits of advanced networking, CENIC is composed of a staff of expert network engineers and other network solutions specialists, all intimately involved with the research and education community. Because of this close involvement with the institutions throughout the state that created CENIC to serve their needs, CalREN and the services CENIC makes available over it are tailored to the missions of the state's research and education community.

The 2008-09 fiscal year was a challenging one for that community, a fact of which CENIC is acutely aware. As a means of leveraging shared resources and helping statewide research and education save on cost, carbon footprint, and time, CalREN is an invaluable part of the community's future. Maintaining the network in as advanced a state as possible — and as cost-effectively as possible — is a crucial part of CENIC's own mission.

CalREN Backbone Node Sites

COR — Corning	MER — Merced	RIV† — Riverside
SFO — San Francisco	SOL — Soledad	TUS — Tustin
OAK† — Oakland	FRE — Fresno	PDC — Palm Desert
SAC† — Sacramento	SLO — San Luis Obispo	SDG — San Diego
PAIX — Palo Alto	BAK — Bakersfield	ELC* — El Centro
SVL† — Sunnyvale	LAX† — Los Angeles	

Currently, CalREN consists of approximately 2,900 miles of owned optical fiber spanning 17 major backbone nodes and including nearly 600 routers, over 100 switches, over 60 optical components, and nearly 500 leased circuits from telecommunications companies to provide high-performance connectivity to public and private K-20 research and education institutions in all 58 counties.

Each network route shown at left* supports up to 32 10-Gigabit channels.
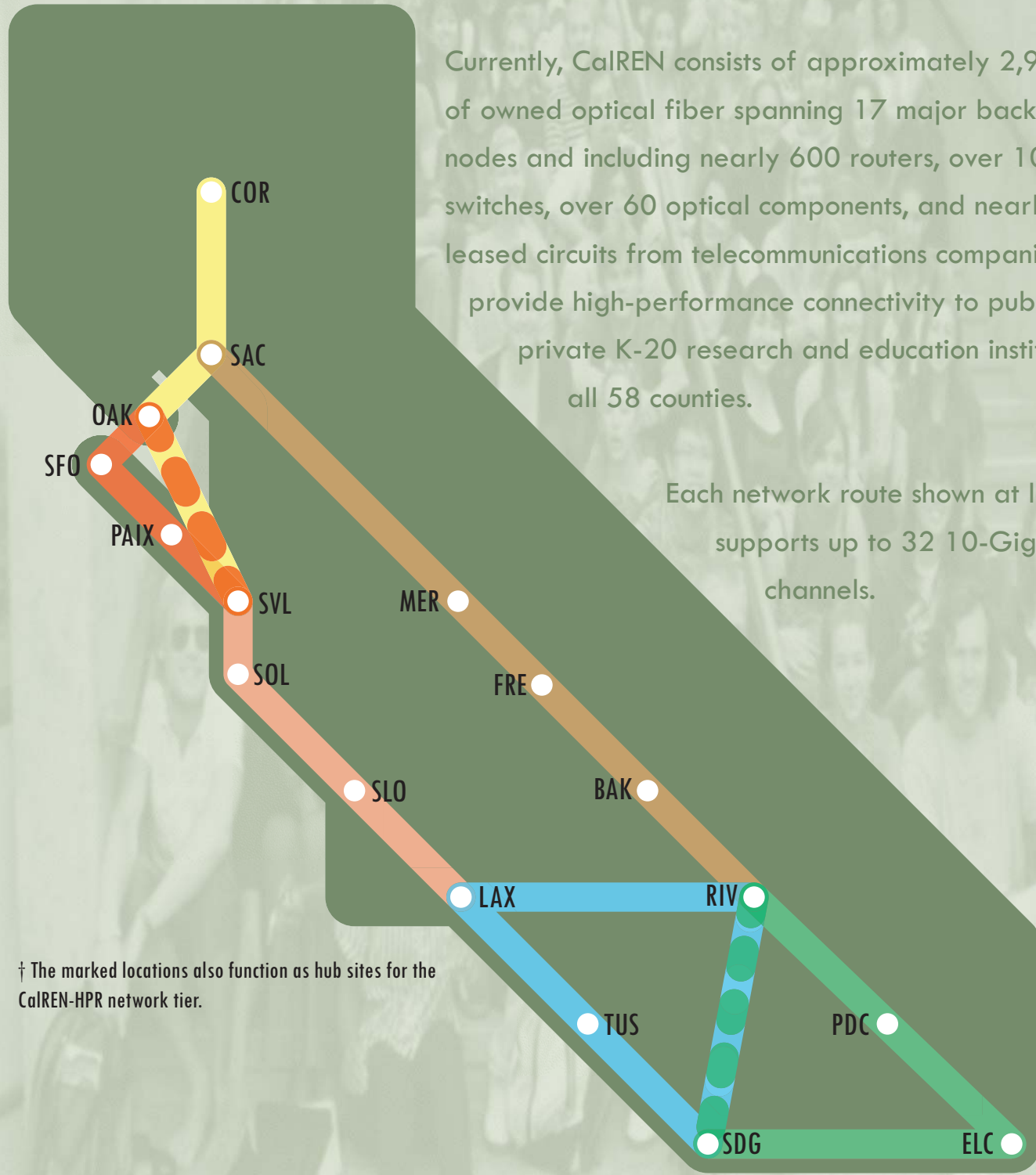
† The marked locations also function as hub sites for the CalREN-HPR network tier.

* The Coachella Route and the COR-SAC path currently support up to 8 10-Gigabit channels.

13

One Backbone, Three Networks

COR
SFO OAK SAC
PAIX
SVL MER
SOL FRE
SLO BAK
LAX RIV
TUS PDC
SDG ELC
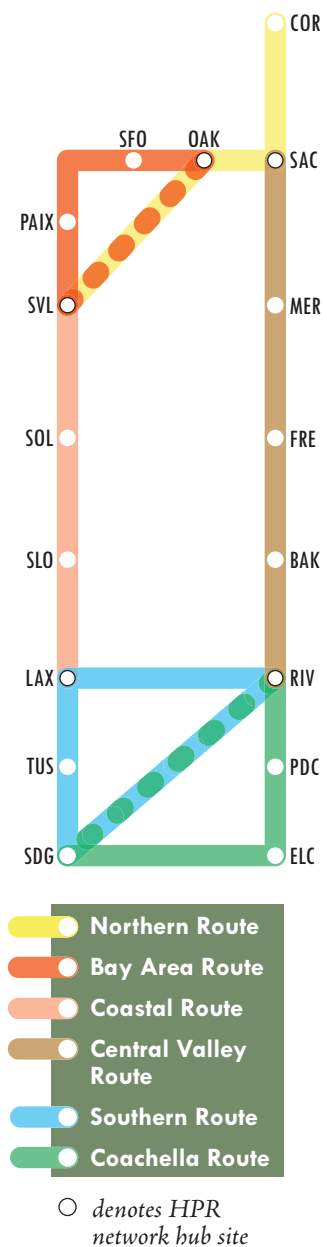
- **Northern Route**
- **Bay Area Route**
- **Coastal Route**
- **Central Valley Route**
- **Southern Route**
- **Coachella Route**

○ *denotes HPR network hub site*

The CalREN backbone is comprised of the network routes and hub sites shown at left. The architecture of the backbone relies heavily on network "rings," which ensure that an interruption in connectivity at any point on the backbone will not keep network traffic from flowing. Dual, diverse connectivity from last-mile to the backbone itself for all CENIC Associates is also strongly pursued, and together, these goals have created an amazingly robust, reliable high-performance network.

However, while there is one CalREN backbone, there are three individual, completely independent networks running over the backbone at any one time. These networks are:

CalREN-DC (Digital California)
Used for day-to-day network activities such as accessing the web, e-mail, and high-quality videoconferencing provided by CalREN Video Services, this network tier features a 10 Gb/s backbone bandwidth and provides connectivity for all CENIC Associates to the commercial Internet.

CalREN-HPR (High-Performance Research)
Used for bandwidth-intensive research applications such as metagenomics, ocean research, astronomy, and other disciplines requiring very high bandwidth and very low latency, this network tier features a backbone bandwidth capable of up to 40 Gb/s and provides research universities with connectivity to the Internet2 network, National LambdaRail's PacketNet, and the Pacific Wave distributed, international peering facility.

CalREN-XD (Experimental/Developmental)
More a collection of services than a fixed network, CalREN-XD consists of a set of network resources which can be earmarked for particular bleeding-edge research needs, including research carried out on CalREN itself. This tier has no fixed backbone bandwidth, and connects to NLR's FrameNet and WaveNet.

2008-09 CalREN Backbone Updates

One of the most significant ongoing projects underlying all three CalREN network tiers has been the replacement of end-of-life optical gear with newer gear that will increase backbone bandwidth and enable more convenient provisioning of circuits for users of the CalREN-XD tier. During the 2008-09 fiscal year, this replacement was completed for the Northern, Coastal, and Southern Routes, with the Central Valley and Bay Area Routes slated to undergo optical refresh next. (The Coachella Route does not employ the old optical gear.)

The refresh of routers underlying the CalREN-DC network tier was also completed with migration of customer traffic scheduled to complete during 2009.

Also undergoing refresh is the CalREN-HPR network tier, divided into a Layer 3 (router), Layer 2, (Ethernet switch), and Layer 1 (optical) refresh. The Layer 3 refresh was completed, with migration of customer traffic scheduled to complete during 2009 as well.

From top:
Aragon High School ∙ San Mateo, CA
City College of San Francisco ∙ San Francisco, CA
California State Polytechnic University, Pomona ∙ Pomona, CA

Many Communities, One Goal

Thanks to the spirit of cooperation between California's various educational and research segments, CENIC has the privilege of serving students, faculty, and staff from kindergarten to post-graduate school.

California's K-12 System is one of the largest in the country, serving nearly all Californians at some point in their lives and preparing the students that will enter into any of the state's institutions of higher education or directly into the California economy. CalREN's connectivity to the K-12 System is comprised of 72 K-12 node sites (most of them County Offices of Education and similar sites) which then provide connectivity to over 8,000 schools and other district offices. All in all, nearly six and a half million children are served by the state's K-12 system and thus CalREN.

From there, many students matriculate at one of California's Community Colleges. Spread throughout the state, the 110 campuses of the community college system are also connected to CalREN and allow CENIC to serve nearly two million students, not to mention faculty and staff.

Many of the students from the California Community College System enter directly into the state economy, but many others transfer to the California State University or the University of California. The California State University is the largest and most diverse university system in the country, with nearly half a million students in addition to their faculty and staff. The University of California is the world's most accomplished research university system, and eight of its undergraduate campuses are ranked among the top 100, six among the top 50, and two among the top 25 US universities by top rankings. The University features more Nobel prize winners among its faculty than any other in the world, and many top corporations were begun by UC graduates. Several thousand more students attend the prestigious private universities Caltech, Stanford, and USC, globally known for their leadership in many diverse fields.

All are served by CENIC and CalREN.

2008-09 CalREN K-12 Updates

As part of an ongoing, extensive upgrade to the circuits by which California's K-12 System sites connect to one another and CalREN, the following circuits were upgraded to cost-effective Gigabit connectivity during the 2008-09 fiscal year:

July 2008:
San Joaquin COE – Merced Backbone Node
Riverside COE – Orange CDE
Tulare COE – Kings COE

August 2008:
Sutter CSS – Shasta COE
Red Bluff UHSD – Corning BN
Sutter CSS – CA DOE
Glenn COE – Butte COE
Shasta COE – Red Bluff UHSD

September 2008:
El Dorado COE – Sacramento COE
San Benito COE – Soledad BN
San Benito COE – Monterey COE
Colusa COE – Sutter CSS
Amador COE – Merced BN
Pomona USD – Los Angeles BN

October 2008:
Placer COE – Sacramento BN
Yolo COE – Sacramento BN
Yolo COE – CA DOE
Nevada JUHSD – Sacramento BN

November 2008:
Discovery Secondary School – Merced BN
Mendocino COE – Sonoma COE
Lake COE – Mendocino COE
* Kern CSS – San Luis Obispo COE

January 2009:
Chaffey JUHSD – San Bernardino CSS
Chaffey JUHSD – Tustin BN
Fort Bragg USD – Mendocino COE
Napa Valley USD – Sonoma COE

February 2009:
Lake COE – Oakland BN
Napa Valley USD – Solano COE
Amador COE – Calaveras COE
Calaveras COE – Tuolumne COE
* Ventura COE – Santa Barbara COE

March 2009:
Lake Tahoe USD – Truckee High School

* DS-3 connections

Also, the connection to the Truckee Donner Public Utility District was moved to Truckee High School.

2008-09 Community College Updates

CENIC has also undertaken an extensive program of upgrades to the circuits by which California's Community Colleges connect to CalREN. As part of this program of upgrades, the following circuits were upgraded to cost-effective Gigabit connectivity during the 2008-09 fiscal year, improving connectivity for some 630,000 California students and their faculty and staff:

July 2008:
MiraCosta College – San Diego Backbone Node
State Center CCD – Fresno BN
Santa Ana College – Los Angeles BN
Santa Rosa Junior College – San Francisco BN

August 2008:
Cypress College – Los Angeles BN
Fullerton College – Los Angeles BN
Grossmont College – San Diego BN
Southwestern College – San Diego BN

September 2008:
Butte College – Corning BN
CCC System Office – Sacramento BN
Yosemite CCD – Merced BN

October 2008:
Foothill College – Oakland BN
Los Angeles CCD – Tustin BN
San Jose Evergreen CCD – Oakland BN

November 2008:
Cabrillo College – Oakland BN
Cerritos College – Tustin BN
College of the Canyons – Tustin BN
De Anza College – Oakland BN
Los Angeles City College – Tustin BN
Los Angeles Pierce College – Tustin BN
Los Angeles Trade Tech – Tustin BN
Los Angeles Valley College – Tustin BN
West Los Angeles College – Tustin BN
Moorpark College – Tustin BN
Santa Monica College – Tustin BN

January 2009:
East Los Angeles College – Tustin BN
* Woodland Community College – Sacramento BN
* Long Beach City College Pacific Coast Campus – Los Angeles BN

* DS-3 connections

2008-09 CSU Updates

In September 2008, the circuit connecting the CSU Salt Lake City Datacenter to the CalREN backbone at Los Angeles was replaced with an OC-3. November 2008 saw the replacement of the connection to the Tustin backbone node for CSU Los Angeles with a more cost-effective Gigabit connection. Lastly, March 2009 saw the completion of a Gigabit connection between Sacramento State University and the Sacramento backbone node.

2008-09 UC Updates

In March 2009, the connection between UCLA and the Tustin backbone node was upgraded to 10 Gb/s, giving the campus dual, diverse 10 Gb/s connectivity to CalREN. And in May 2009, the Lawrence Berkeley National Laboratory was brought into the CENIC community with a Gigabit connection to the Oakland backbone node.

2008-09 Private & Independent Updates

In March 2009, Stanford University's Auxiliary Datacenter received a Gigabit connection to the Oakland backbone node, and May 2009 saw Stanford's Hopkins Marine Station receive Gigabit connectivity to the Sunnyvale backbone node.

2008-09 Non-Charter Upgrades & Connections

August 2008 saw two upgrades to non-charter members of the CENIC community. The West LA Graduate Campus for the Graziadio School of Business & Management of Pepperdine University received a 250 Mb/s connection to the Los Angeles backbone node, and the Los Angeles Campus of the Chicago School of Professional Psychology received a connection to the Los Angeles backbone node as well. March 2009 saw the University of San Francisco receive an upgrade from a 100 Mb/s to a 250 Mb/s connection to the San Francisco backbone node. Lastly, June 2009 welcomed a new member of the CENIC community, the Carnegie Mellon University's Silicon Valley Campus, which received an 100 Mb/s bandwidth connection to CalREN via the NASA Ames Research Center.

CalREN Video Services: Saving Cost and Carbon

With the current financial climate in California, and the growing concern in education over developing sustainable practices, travel has become one of the most closely controlled budget items for faculty and staff. This has made high-quality videoconferencing invaluable for conducting administrative business between campuses. There was a 3% increase in administrative use of videoconferencing over the previous year. Yet, academic use remains dominant and is especially important in providing educational opportunities to students in areas without traditional access to specific programs or where the general economic climate may impact such students ability to use a traditional classroom even during a time of burgeoning enrollment.

In 2008-09 over 2,600 scheduled videoconferences were held using the CVS Online Scheduling Desk, representing approximately 20,675 port hours of videoconference activity. As in years past, peak scheduled usage continues to occur at mid-semester (October and April).

Total Conferences by Month 2008-09
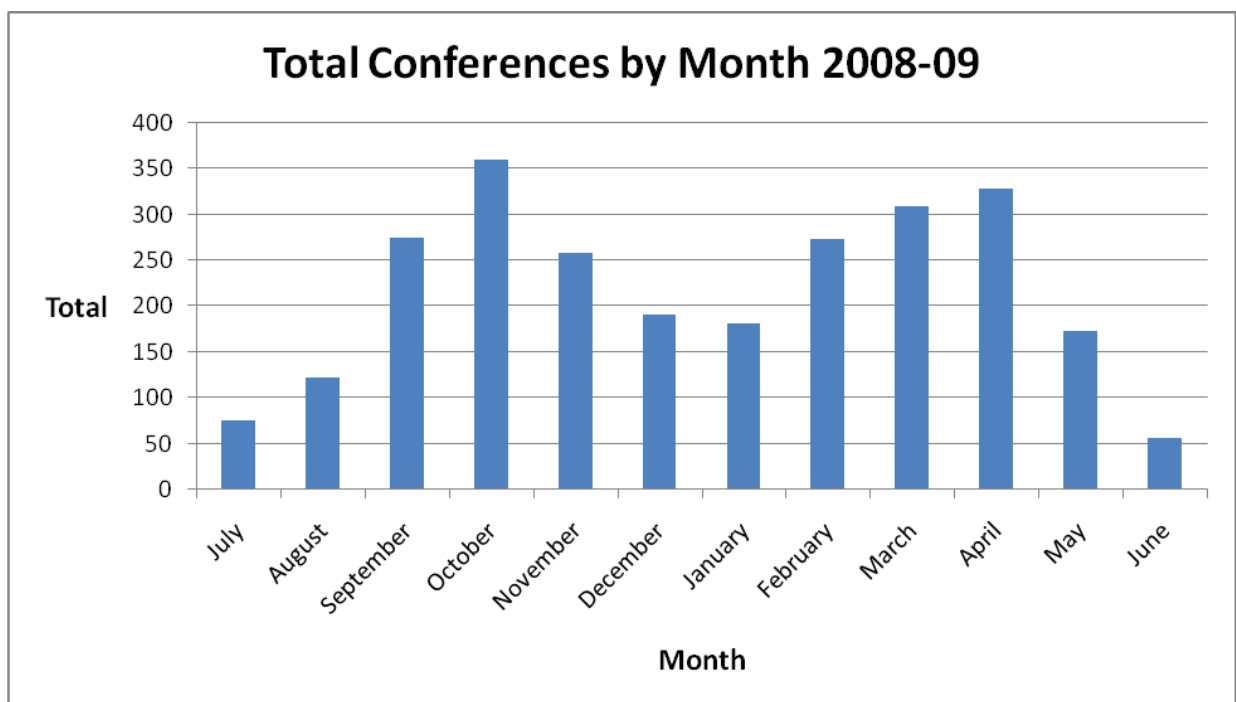
83% of the total scheduled conferences held during the past fiscal year were academic conferences. However, there is strong anecdotal evidence that the number of academic videoconferences held is significantly higher than reported through CVS, since point-to-point conferences, which are conducted directly between two sites, are not included in our statistics. This informal data has been provided by Videoconference Administrators at sites where these conferences occur, but CENIC does not currently have a mechanism in place to track point-to-point conferences, so such data cannot be quantified.

About CalREN Video Services

CalREN Video Services (CVS) offers high-quality videoconferencing services to over 170 K-20 sites throughout California, facilitating the development and success of virtual communities. Via its seamless connection to the Internet2 Commons, CVS also makes it easy for California sites to participate in videoconferences with K-20 sites throughout the United States and internationally.

CVS operates videoconferencing infrastructure consisting of multipoint control units (MCUs), a real-time, online conference scheduling system, gatekeepers and proxy servers, and 24/7 support of videoconferences. Through the CVS Scheduling Desk, 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 VA's 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 can be found at **cvs.cenic.org**.

The CENIC Network Operations Center

CENIC NOC Engineers in the process of removing end-of-life optical equipment as part of the CalREN backbone update.

CENIC's Network Operations Center or NOC functions as the 24/7/365 primary point of contact within CENIC for all services provided over CalREN. All three tiers of CalREN are monitored and managed by the network engineers in the NOC.

The technical functions performed by the CENIC NOC include the administration of the optical (Layer 1), Ethernet (Layer 2), and routing (Layer 3) components of the three tiers of CalREN, as well as Layer 1 (fiber and optronics) support for National LambdaRail. The network engineers of the NOC also diagnose and resolve equipment failures, aid in the decommissioning of retired equipment across the entire CalREN network, and perform needed tasks in support of circuit installations and backbone upgrades, of which there have been a significant number during the 2008-09 fiscal year.

The network engineers of the NOC also continuously develop many aspects of the NOC itself, including the support documentation and processes as well as actively planning the development of technical knowledge and experience within the team. Keeping the NOC team current with newer technologies implemented within CalREN is an exciting, but necessary activity for supporting the evolving needs of the CalREN customers.

Of course, the CENIC NOC and network engineers also function as the main customer interface between CENIC and the communities we serve. This function includes responding to abuse complaints and coordinating service upgrades to sites, and planning and communicating maintenance events.

Setting a High Standard for Customer Service

Over the 2008-09 fiscal year, the CENIC NOC has responded to 9,728 requests for support with professionalism, skill, and efficiency. Beginning in February 2005, feedback has been solicited of 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 and problem ticket. Since its inception, 453 responses have been collected.

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

96% ▷ 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.

94% ▷ 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.

96% ▷ The CENIC NOC representative I worked with understood my problem.

96% ▷ … handled my problem with an appropriate level of urgency.

95% ▷ … followed through with requested information.

96% ▷ … confirmed that I was satisfied with the resolution.

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

Beyond California: Pacific Wave & TransitRail

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 throughout the Pacific Rim are able to collaborate with one another, and California's K-20 community with them.

Pacific Wave is operated by CENIC and the Pacific Northwest Gigapop with the support of the University of Washington and the University of Southern California. Its member networks include:

KREONET2 • KOREN

T-LEX • GEMNET • SINET
SOFTBANK TELECOM

QATAR FOUNDATION

TWAREN

UNINET • THAIREN

NUS GIGAPOP

AARNET

KAREN

    AUSTRALIA: AARNet
    CANADA: CANARIE
    JAPAN: T-LEX, GEMnet, SINET, Softbank
        Telecom (ODN)
    KOREA: KREONet2 • KOREN
    NEW ZEALAND: KAREN
    QATAR: The Qatar Foundation
    MEXICO: CUDI
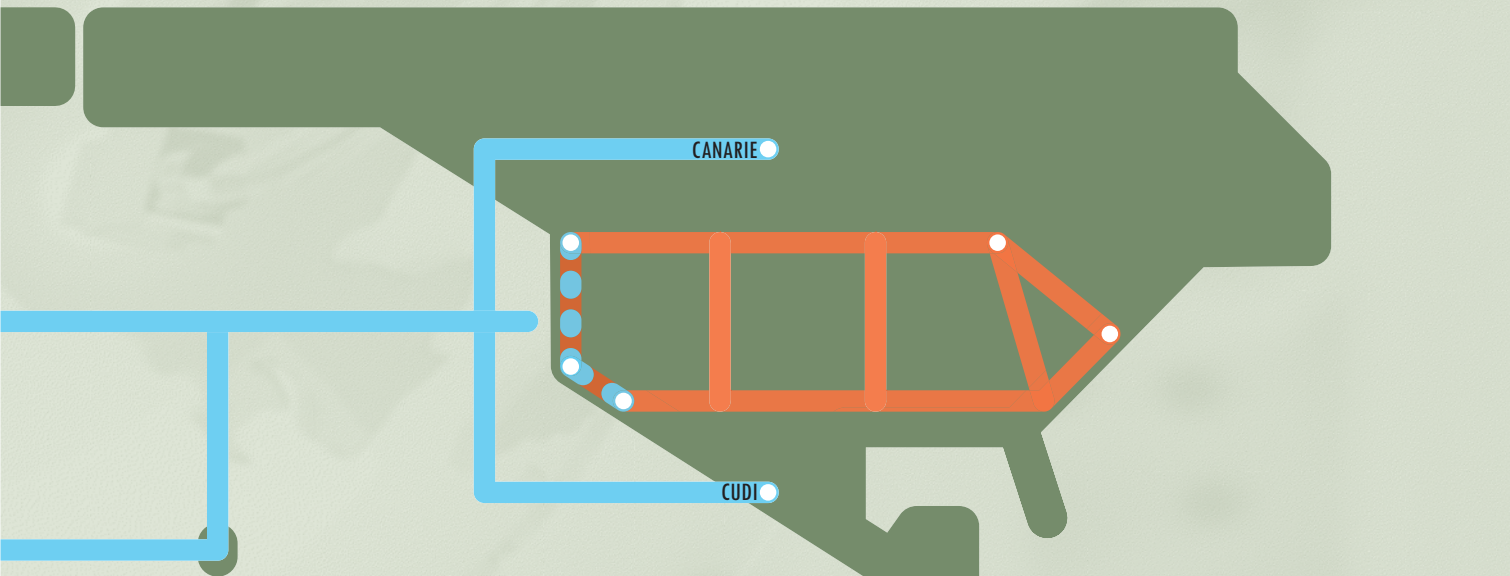   **TAIWAN:** TWAREN
    THAILAND: UniNet • ThaiREN
    SINGAPORE: NUS Gigapop
    UNITED STATES: CENIC, DREN, ESnet, Google, Internet2, Los Nettos, Microsoft, NREN,
        National LambdaRail, Pacific Northwest Gigapop, TransPAC2, Ultralight

CANARIE

CUDI

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 Network Connections**
● **TransitRail Network Infrastructure**

The 2008 CalREN-XD/HPR Workshop

From the top: Atkinson Hall, the home of Calit2@UCSD, and Ed Seidel of the Office of Cyberinfrastructure at the NSF addressing attendees

CENIC's unique position at the center of the fiber-optic "web" extending throughout the state means that we are able to create globally unique opportunities for advanced research, putting not only machines but people in touch with one another to share their achievements, learn from their experiences, and create greater opportunities for themselves and their institutions.

On September 15-16, 2008 CENIC held the CalREN-XD/HPR Workshop, a research workshop to demonstrate the uses of bleeding-edge networking. This conference was planned by and overseen by the CENIC Board's XD/HPR committee chaired by Caltech's John Dundas, and held at the California Institute for Telecommunications and Information Technology (Calit2) at the UC San Diego campus.

During the conference, scientists and technologists from some of California's most prestigious research universities and beyond gathered at Calit2 at UC San Diego to discuss and demonstrate the high-performance research made possible by CalREN's fiber-optic infrastructure and networks. Institutions from throughout the state staged 13 high-performance demonstrations, eight of which required multi-Gigabit bandwidth.

These demonstrations took place throughout the first day of the Workshop in various locations around Atkinson Hall, Calit2's headquarters building at UC San Diego. All were supported by the ultra-high performance networking provided by CalREN. Attendees were wowed by simultaneous demonstrations in research areas as diverse as space science, high-quality interactive cinema, cloud and grid computing, geospatial data, telepresence, and data visualization. Presentations were given on CineGrid, the OptIPlanet collaboratory, and trans-Pacific networking via Pacific Wave, and the workshop was pleased to feature campus-specific infrastructure presentations centering on the UC San Diego, Irvine, and Davis campuses as well as the entire UC system as a whole.

The topic of cyberinfrastructure was treated by UCSD Vice Chancellor for Research Arthur Ellis when he discussed developing a strategic plan for research cyberinfrastructure for a university campus and system. Attendees also enjoyed an excellent presentation on cyberinfrastructure by the new Director of the National Science Foundation's Office of Cyberinfrastructure Ed Seidel, introduced by UCSD Chancellor Marye Anne Fox, as well as discussions of the current state and projected future of CalREN itself.

With the invaluable assistance of the staff at Calit2, the Workshop was a stunning success as a learning and networking experience (both in terms of hardware and people). Attendees were able to see the highest-performance tier of the CalREN network enabling multiple live demonstrations of some of the most advanced technology known, as well as taking away valuable lessons from many of the world's most accomplished technologists and researchers.

You can find presentations online at http://www.cenic.org/workshop/ as well as links to streaming video of many presentations courtesy of Calit2 at UC San Diego.

Pedal to the Metal:
A Showcase of Demonstrations

In the most fundamental sense, advanced networks make the world go away — at least, the parts of it that stand between us and the things of interest to us, including one another. Banishing the isolating effects of great distances is the most basic "killer app" of high-bandwidth, fiber-based networks, and the demonstrations hosted at Calit2 at UC San Diego during the CalREN-XD/HPR Workshop functioned elegantly to show the various ways in which this can be achieved.
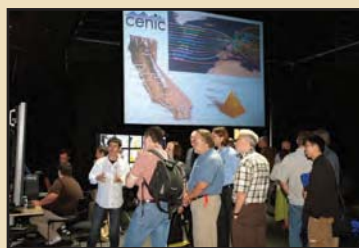
Making high-tech resources of all kinds — including the researchers themselves! — available with advanced networks enables researchers and institutions to squeeze every last drop of value from their investments of money and manpower, while allowing the world to take advantage of and build collaborations around them on-the-fly, without excessive cost- or carbon-hungry travel or human resources overhead.

A Showcase of Demonstrations: Controlling & Processing at a Distance

Large datasets, supercomputers, and remote observatories and instrumentation are of enormous value to researchers around the globe, but they are often unwieldy treasures, often located at one prominent university or laboratory in the case of terabyte-sized datasets or supercomputers, or in places that are difficult to visit and even outright hostile to human life as with some seismic, marine, or astronomical observatories. Connecting researchers worldwide to resources that might otherwise remain inaccessible to them is one of the most basic and important uses of advanced networks.

Synthesizing Disparate Components

Reaching remotely located resources is a vital first step in making use of them, but a natural next step is to reach multiple resources at the same time and configure them into a new resource — building vast, new datasets through synthesizing, comparing, and mining smaller, geographically dispersed ones, assembling rich media from around the world for use in a single location such as a classroom, and bringing into existence entire virtual laboratories by simultaneous control of widely located instrumentation.

Synthesizing Entire Locations

The ultimate step, of course, for bringing together dispersed resources, is not only to reach data, processing, or instrumentation but other researchers themselves as well, and to connect them to one another as much as to any one specific user. Through this model, entire reconfigurable virtual collaborations are built, consisting of laboratories, computation resources, and research teams that span the globe.

Grid & Cloud Computing

Of course, bringing diverse locations together across continents and oceans to create seamless environments for collaboration is not a simple matter. If it's not done properly, the collaborative environment itself can become an obstacle to the researchers, and the data and instrumentation associated with each discipline can require very different approaches in terms of storage and processing, as well as how the data itself is to be shared. Advances in grid and cloud computing are the connective tissue that holds the collaborative environment together and enables it to function smoothly, and just like advanced networks in general, it is often at its best when those who benefit from it are least aware of it.
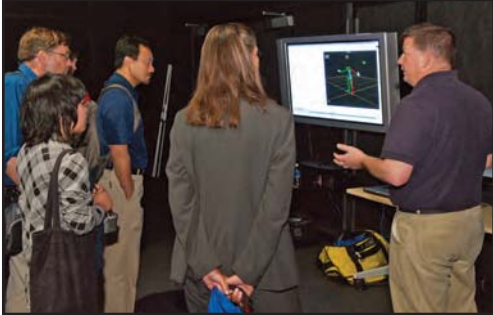
Performance Capture for Training and Simulation · Naval Postgraduate School

Next Generation Internet and the Future of Public Broadcasting · INGI
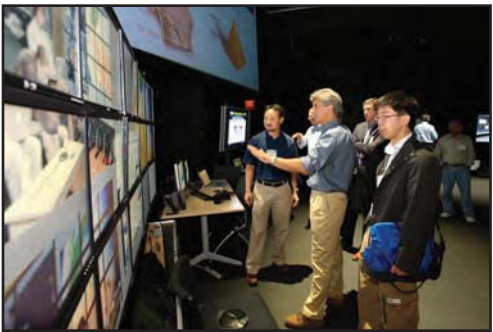
Visualcasting: Global Ultra-High-Resolution Telepresence · UIC EVL

University of CA Grid Portal · UCLA

A Super Time in Austin: Supercomputing 08

Demonstrations taking place at the booth of CalREN Associate the San Diego Supercomputer Center, and a welcome address by former Center Director Francine Berman

From November 15-21, 2008, booth 568 at the Austin Convention Center was humming with activity as the San Diego Supercomputer Center (SDSC), Calit2 and its guest the Electronic Visualization Lab (EVL) from the University of Illinois at Chicago, and CENIC gave talks and demonstrations illustrating the work being done by all to advance global sustainability and green computing at SC08, the twentieth such conference.

The conference opened on Monday morning with a welcome address in the booth by SDSC Director Francine Berman wherein she highlighted the work being done at the Center to accelerate green computing and networking – including its new "green" facility. Other luminaries such as Calit2's Tom DeFanti and the SDSC's Allan Snavely discussed other green computing projects taking place, including the GreenLight project, to improve data center and computational energy efficiency. Other presentations focused on high-performance analytics at the SDSC, the EVL's Global Visualcasting, the Tropical Ecology Assessment and Monitoring and Cancer Center projects at the SDSC, measuring TeraGrid performance, and more. CENIC Publicity and Communications Manager Janis Cortese also gave two presentations available at the CENIC website on the CalREN Network and CENIC itself, as well as the CalREN-XD/HPR Workshop discussed previously.

Demonstrations taking place at the booth included the OptIPortal's stunning Gigapixel display and the interface used by viewers to interact with it, as well as one of the bandwidth challenges put forth for this year's conference by the EVL and previously run at the CalREN-XD/HPR Workshop, Global Visualcasting.

This year's Bandwidth Challenge winner was also in attendance at the Workshop, the University of Illinois at Chicago's cloud computing demonstration, led by Dr. Yunhong Gu of the University of Illinois at Chicago and Dr. Robert Grossman of the University of Illinois at Chicago and Open Data Group.

Other CENIC Associates in attendance at SC08 included Bandwidth Challenge finalist Caltech Center for Advanced Computing (which used the previous CENIC Innovations in Networking Award-winning projects MonALISA and UltraLight), the University of Southern California, NASA (including CENIC Associate the NASA Ames Research Center), and the Stanford Linear Accelerator Center, which serves as a Tier 2 computing center for the ATLAS experiment at the recently inaugurated Large Hadron Collider at CERN on the French-Swiss border.

As topical as the booth theme of green computing was this year, with the current keen interest in making computing centers more energy-conscious, particularly in areas of cooling, next year's Supercomputing conference in Portland, Oregon will be even more so with its theme of "Computing for a Changing World." For information about SC09, you can visit the conference website.

CENIC at CISOA: Community College IT Comes Together in Tahoe

Community College IT professionals from all over the state came together from April 26-29, 2009 at the Granlibakken Conference Center in Tahoe City for the 2009 Annual Conference for CISOA, the California Community College's Chief Information Systems Officers Association.

CENIC Project Manager Ed Smith co-presented a breakout session together with Catherine McKenzie, Technology Unit Director at the CCC System Office. The session was titled "Annual CENIC, CalREN, and TTIP Funding Update" and provided attendees with an update on network related

CENIC Project Manager Ed Smith and CENIC Board member Catherine McKenzie

activities in progress at CENIC, the three CalREN networks, and the network related technology priorities and strategies the CCC System Office has for the colleges and their centers.

Riding the Waves of Innovation in Long Beach

Inaugural international videoconference for the Global Library Education & Research Network (GLiMERNet), and Dennis Davino, Special Projects Director for Teacher Preparation, Educational Interpreter, and Paraprofessional Programs at Cypress College

The 2009 CENIC Annual Conference, RIDING THE WAVES OF INNOVATION, presented the CENIC community with one of the most diverse programs yet. True to the conference theme, innovation in sustainability initiatives, green computing, advanced networking, and teaching and learning were highlights of the program presented at the Hilton Long Beach on March 9-11, 2009.

Research presentations featured advanced networking in extreme environments, distributed computing, high-definition cinematic content, collaborative research tools, and strategies for disaster recovery. Teaching and learning presentations showcased innovations in the use of videoconferencing, Cyber-Archaeology and Visual History. Extending the classroom and using advanced networks to reshape the pedagogical process itself were also hot topics, with presentations on the California Virtual Campus, the NSF-funded Mid-Pacific ICT Center, and various online strategies for language learning.

Of course, the CENIC Annual Conference would not be possible without the generous support of corporate sponsors who stand as valued partners in bringing the benefits of high-performance networking to California. We're proud to thank the following sponsors for their support:

Titanium Sponsor: Cisco Systems
Platinum Sponsors: AT&T and Juniper Networks
Gold Sponsors: Brocade and Qwest Communications
Silver Sponsors: Level3 Communications and Comcast

Preparations are underway for the CENIC 2010 Annual Conference, to be held March 8-10, 2010 in Monterey, CA. More information can be found at cenic2010.cenic.org.

Award Winners and Other Highlights from Long Beach

Facilitator of the GLiMERNet international consortium on archaeology Ed Johanson is fond of the story of Lycurgus, a famous lawgiver of the ancient Greek city-state of Sparta. Legend has it that Lycurgus ordered the removal of the walls surrounding Sparta with the quote, "I will replace this wall of bricks with a wall of men." Johanson finds it a fitting metaphor for GLiMERNet, which he sees as a reimagining of the traditional brick-and-mortar model for museums, making them museums not of bricks but of people with the help of advanced networks.

Conference attendees were able to experience this firsthand by participating in the launch of GLiMERNet through a live international videoconference pictured at left which included participants from the Consiglio Nazionale della Ricerche (National Research Council) in Rome, UNESCO, Indiana University, and North Dakota State University.


The **Keynote Addresses** by Stanford University's **Guru Parulkar** and Telepoly Consulting's **John Windhausen** focused on two of the hottest topics in advanced networking: the reinvention of the Internet through innovations, especially in networking and systems, and overcoming the obstacles facing the ubiquitous spread of broadband. Both talks are available for viewing on demand at the CENIC 2009 conference website and are linked below:

PLAY NOW

Reinventing the Internet by Creating Platforms for Innovation

PLAY NOW

A Blueprint for Big Broadband

alternate endings

laugh. cry. live. die. try again.

VISIT SITE
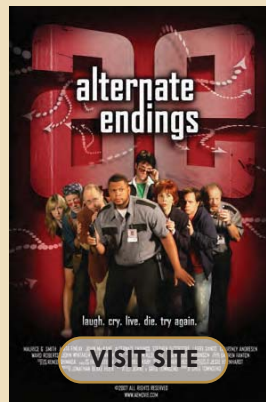
The extension of a 1Gbps link from CalREN into the Hilton Long Beach for CENIC conference use was tested with a special screening of the interactive, high-definition comedy/mystery movie **Alternate Endings** hosted by USC Professor Richard Weinberg. A 2009 Innovations in Networking Award winner, **Alternate Endings** merges high-definition content with a live video stream as hosts at USC prompt the audience, at specific plot points, to choose the path that the plot will follow.

Alternate Endings comprises sixteen different storylines and five separate endings, and the film can run anywhere from 25 to 40 minutes on average. The screening was a highlight of the conference program.

Innovations in Networking Award Winners for 2009 Educational Applications: "Alternate Endings"

Presented in high-definition with 5.1 channel sound, **Alternate Endings** represents a significant step forward in realizing the potential of high-performance networks to change our shared culture. USC Master's student Greg Townsend and Professor of Cinematic Arts Richard Weinberg partnered on this project, which combines filmmaking arts with television studio and network systems to create a compelling, interactive group experience.

On September 15, 2008 as part of a showcase of high-bandwidth demonstrations using CalREN's experimental and high-performance networking tiers, an audience in Atkinson Hall on the UC San Diego campus participated in the remote premiere of the movie, a comedy-mystery that allows its audience to choose the direction of the plot through one of 16 separate paths. The movie itself was streamed from the Trojan Vision television studios in the Robert Zemeckis Center for Digital Arts on the USC campus. It was digitally merged (using green screen technology) at specific decision points with remote moderators, located in a separate building within USC's School of Cinematic Arts, and delivered via CENIC's CalREN to the audience 120 miles away in Atkinson Hall. At each decision point, the moderators solicited audience feedback, by means of applause, and used the audience's choice to select which path the movie should follow. Characters' guilt, innocence, and even survival were determined by audience feedback. The experience was a smashing success, with the technology playing a starring role and performing flawlessly.
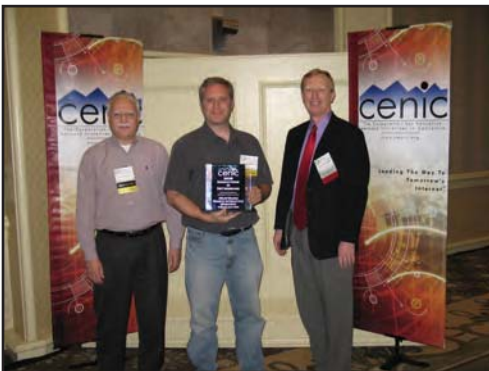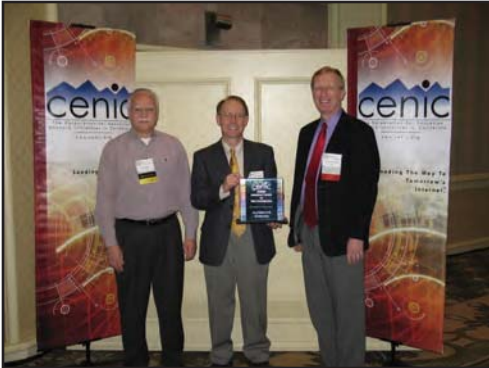
High-Performance Research Applications: iWarp-Based Remote Interactive Scientific Visualization

Sending high-definition video reliably from one place to another, across multiple networks, is enough of a challenge to merit its own recognition. When the individual on the far end of the connection expects to be able to rotate, grow or shrink, and otherwise manipulate the video images in real time and experience no latency, the challenge becomes even more daunting. This is precisely what Scott Friedman of UCLA Academic Technology Services achieved with iWarp-Based Remote Interactive Scientific Visualization. Since winning an Honorable Mention at the 2007 Supercomputing conference for, as one judge put it, "making it look easy," Friedman has added temporally evolving data to the challenge, which increases the processing demands, along with requirements for reliability and zero latency, in the advanced network linking the data, the processing, and those interacting with both.

2009 Innovations in Networking Award Winners accepting their awards from Jim Dolgonas (CENIC) and 2009 Conference Committee Chair Doug Hartline (UCSC)

From top: Richard Weinberg, USC Scott Friedman, UCLA Larry Smarr, Tom DeFanti, and Greg Hidley, Calit2

Experimental/Developmental Applications: Project GreenLight

According to The Climate Group's Smart 2020 report, released in June of 2008, the Information and Communications Technology (ICT) industry's carbon footprint of 2% is equal to that of the airline industry. This is the largest carbon footprint of any single industry. However, wise application of ICT across all sectors could create a reduction in overall carbon footprint by as much as five times the ICT industry's own footprint.

This news is a call to action for everyone, but for researchers at Calit2, it's also a unique call to innovation. They have initiated Project GreenLight to discover creative ways to ensure that the next generation of data centers supports a sustainable lifestyle and that the research sectors that use them are aware of the issues surrounding carbon-thrifty computing. Not only will the hardware and software itself be studied to determine how best they can be optimized, but the equally crucial factors of cooling and structural engineering will be studied in depth, along with applications from a myriad of data-intensive disciplines. Project GreenLight will also analyze how best to share the resulting insights to enable as many other researchers to benefit from them as possible.

Gigabit/Broadband Applications: Redwood Coast Connect

In November 2006, Governor Arnold Schwarzenegger issued an executive order calling for the formation of the California Broadband Task Force, and charged the Task Force with determining the current state of broadband penetration in California and the obstacles to its advance. They were also asked to posit creative and effective ways by which broadband infrastructure could be improved. Particular care was to be paid to areas with relatively poor broadband penetration and significant economic or geographic challenges to providing and improving broadband access.

One of those regions with unique requirements is the Redwood coast, consisting of the counties of Del Norte, Humboldt, and Mendocino along the Pacific Ocean, and the inland county of Trinity. Overcoming the challenges to providing these rugged, often heavily forested, areas with the broadband penetration they need in the coming century will require a great deal of careful study and commitment.

Once such study – Redwood Coast Connect – was carried out by Redwood Coast Rural Action, a regional network of community leaders in partnership with the California Emerging Technology Fund (CETF). The study provides broadband providers, telecommunications carriers, service providers, elected officials, and other interested parties with precisely the kind of hard data on people, places, and technology needed to propose and implement effective solutions to the networking problems facing the California Redwood coast. For those who would design or implement such plans or similar regional studies, the insights gathered through Redwood Coast Connect will prove themselves invaluable.

Outstanding Individual Contribution: Russ Hobby

Russ Hobby, Cyberinfrastructure Program Architect at UC Davis, has long been active in the research and application of networking and in particular in California's networking efforts through various roles with CENIC. Russ served as the first chair of CENIC's Technical Advisory Council (TAC) and continued to serve in this position from 1997 to July 2001. As the chair, he provided the leadership required to build camaraderie across institutions within California. He was instrumental in conducting design efforts for the original CalREN-2 network and coordinated efforts to set technical policy and future directions for the new network, vital foundational work that will continue to benefit California's research and education community for a long time to come.

Russ led CENIC's Optical Network Initiative (ONI) architecture team to develop the first CalREN optical network, now the underlying framework for all three network tiers. He also served on CENIC Annual Conference Program Committees during his tenure as TAC Chair and has continued to participate in CENIC activities.
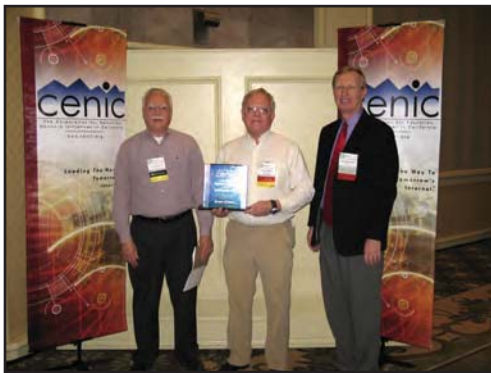
From top: Tina Nerat, NERATECH
Russ Hobby, Outstanding Individual
Contribution Awardee

CENIC Outreach in Mexico

Chamber of Deputies Interior, Mexico City

In August of 2008, CENIC President & CEO Jim Dolgonas was honored to speak before the Mexican Chamber of Deputies (the lower house of the bicameral Mexican government) as a participant in a forum entitled Red Nacional del Conocimiento: Estrategia Nacional para la Conectividad (A National Knowledge Network: A National Strategy for Connectivity). The forum took place on August 26, 2008 at the Palacio Legislativo de San Lázaro in Mexico City, home of the Chamber of Deputies, one of the two houses of the Mexican Congress of the Union.

Distinguished participants included, among others, the former President of the Chamber of Deputies Directive Board Ruth Zavaleta Salgado, President of the Council of Political Coordination Héctor Larios Córdova, President of the Special Commission for the Promotion of Mexican Digital Access Antonio Vega Corona, Undersecretary for Communications of the Ministry of Communications and Transport Rafael Noel del Villar Alrich, Chairman of the National Knowledge Commission for the Government of India Sam Pitroda, and Secretary-General of ANUIES (National Association of Universities and Institutes of Higher Learning) Rafael López Castañares. Panels in state and federal-level infrastructure as well as university cooperation featured yet more luminaries in the realm of Mexican high-performance networking.

Jim Dolgonas's presentation, Knowledge Networking: Exploiting California's Experience, discussed the creation and governance of CENIC and its funding and fee structure, the importance of broadband networking as a major motivator of economic and research-based vigor, and the value of using a separate, fiber-based network to serve the needs of higher education and research. The presentation also included an excellent sample of the types of international research collaborations made possible by high-performance networking, as well as discussing the value of such a network to intra-Mexican efforts.

"This forum was an excellent example of the ways in which governments can consider and develop strategies to exploit high-performance networking to

the benefit of their nation's research and education communities and to encourage innovation," said Dolgonas, "as well as being an example of the ways in which the international community can join forces to ensure that important lessons learned are communicated among the global research and education community. CENIC is deeply honored to have had the opportunity to participate and share ideas among such distinguished company, and we look forward to further such opportunities."

CineGrid Workshop at Calit2@UCSD Photonic Networks and Digital Media

The most recent CineGrid Workshop was held from December 7-10, 2008 at Calit2's headquarters at UC San Diego, Atkinson Hall. Attendees included CineGrid luminaries from Amsterdam, Toronto, San Diego, Tokyo, and Chapel Hill, North Carolina.

The workshop was composed of presentations and demonstrations by some of the most active researchers in the field of digital media over photonic networks, centering on CineGrid member projects, the latest hardware, software, and networking technology developments underpinning the projects, and the ways in which CineGrid supports various disciplines. Among these presentations was one given by CENIC President and CEO Jim Dolgonas, Connecting to CineGrid in California.

Representing CENIC at the Mid-Pacific ICT Center

In November of 2008, the National Science Foundation awarded a $3 million grant to establish the Mid-Pacific Information and Communications Technologies (MPICT) Regional Center, headquartered at City College of San Francisco (CCSF). The Center announced the award at a press conference attended by Congresswoman Jackie Speier and many other luminaries, including CCSF Interim Chancellor Don Q. Griffin and the MPICT Center's Principal Investigator Pierre Thiry and Executive Director James Jones.

MPICT's mission is to coordinate, promote and improve the quality of ICT education, with an emphasis on two-year colleges, in a region consisting of northern California, northern Nevada, southern Oregon, Hawaii and the Pacific Territories. The Center will leverage the abundant ICT industry and academic resources of the San Francisco Bay Area and Silicon Valley to enrich educational experiences and outcomes for faculty and students throughout its region.

Said Congresswoman Speier, "This grant from the National Science Foundation will not only benefit the thousands of students in CCSF's Computer Networking and Information Technology Department, but the entire community by helping to train the next generation of innovators who are so vital to the economy of the greater San Francisco Bay Area."

Also attending the event and speaking on behalf of CENIC was Jim Dolgonas, who expressed great satisfaction at seeing the CENIC mission validated so perfectly by the creation of the MPICT Center. "Ten years ago, California's visionary research and education community knew that high-performance networking would play a crucial role in the years to come in empowering advances that would transform not only individual institutions and segments, but society as a whole." Dolgonas added, "All of what was imagined ten years ago is what the MPICT Center aims to achieve: the scaling of efforts; leveraging resources across regional, segmental, and even

state or national boundaries; enabling collaboration between yourselves and with government and industry; reaching out to traditionally underserved populations; ultimately improving and redefining education and redrawing the model of how teaching and learning takes place using reliable high-performance networking."

A Call to Action on Climate Change in Montréal

With over 100 Nobel laureates calling California home, and with Canada ranking first among the G-7 nations in terms of research publications, a partnership between the two would be of great benefit to them and the world – and that partnership is called the Canada-California Strategic Innovation Partnership or CCSIP. CCSIP seeks to catalyze collaborative research, development, and delivery between California and Canada by bringing together the best minds and innovation resources from California and Canada, stimulating new models for collaboration, and providing leadership on the sustainability challenges facing our planet today.

The CCSIP has held three summits to bring together some of the best leaders and researchers in these areas. The first of those was held in January 2006 at UCLA and the second in June 2006 in Vancouver, and CENIC President & CEO Jim Dolgonas has been proud to participate in all of them.

On October 27, 2008, the third summit was held in Montréal, Québec, and the meeting was conducted as a series of six parallel workshop tracks concentrating on the following issues and challenges:

- Carbon Capture and Sequestration,
- Green IT and Zero-Carbon Infrastructure,
- Infectious Diseases,
- Next-Generation Digital Media,
- Sustainable Biofuels, and
- Cross-border Intellectual Property

The University of California was strongly represented on all the workshop tracks. Jim Dolgonas participated in the Green IT workshop, and found some of the information discussed during the session quite striking, such as:

✦ California is the 12th largest source of carbon dioxide, and
✦ climate change is occurring more rapidly than earlier projections had shown.

These facts are sobering and a clear call to action for CENIC and the CENIC community. During the 2008-09 fiscal year, CENIC began discussions with a cross-segmental group of Associates about shared collocation or data centers, which could distribute any carbon footprint savings through a large community and thus create an even greater carbon savings. CENIC is looking forward to playing an important role in helping the California research and education community deal with the challenge of global warming.