the corporation for education network initiatives in california

2009-10 annual report

letter from the president

Jim Dolgonas
President & CEO
CENIC

At the close of what has been a challenging fiscal year

for the community that CENIC was created to serve, I can look back at the 2009-10 fiscal year with pride in the past, gratitude in the present, and a sense of sober responsibility for the future.

During a time when California's research and education community has complied with more frugal budgetary restrictions than ever before, CENIC has continued to look for creative ways to husband the resources entrusted to us to provide the increasing levels of service and reliability that our community expects and needs. Consolidating costs and CENIC member traffic, upgrading the CalREN network backbone, and implementing additional middle- and last-mile network solutions have all been major initiatives for the past year, with victories declared that have helped to push California to the top of the list for global connectivity, as you'll read in this Annual Report. Searching for more opportunities to facilitate human networking for the CENIC member community and highlighting that community's advances during times of financial difficulty has also figured prominently as a means of demonstrating what California is capable of even in rugged times. Pride in the accomplishments of the past year, both CENIC's and those of the Associate community, is a particular reward for all of us at CENIC who have the privilege of serving the schools, colleges, universities, and research institutions that comprise us. As you read through this Annual Report, I know that you will share that pride since these are, in every way, your achievements.

There is also a deep sense of gratitude at CENIC for the many members of that community that have made these achievements possible, from the network specialists who never fail to donate time and expertise through the Business and Technical Advisory Councils, to the members of the conference and program committees for the CENIC Annual Conference, to our Board members, our corporate partners, and of course our staff. In last year's Annual Report, I expressed the certainty that the 2008-09 catalogue of achievements would be surpassed in the following year, and thanks to the tireless efforts of all of those mentioned here, that's exactly what happened.

And this of course brings us to the future, as I remain certain that next year's list of accomplishments will once again exceed those of this year despite the trying times in which we find ourselves. California's educational system continues to be the best in the world, from the extensive K-12 system

that supplies students to all segments, to California's Community Colleges – offering the most "bang for the buck" of any educational system in the country, to the California State University which returns the financial investment made on it by the state fivefold to the greater economy, to the University of California and Charter Associates Caltech, Stanford, and USC at the forefront of global innovation, and finally the many Non-Charter institutions served by CENIC which offer their students a wide variety of opportunities for specialized research and education. Taken together, these great institutions function as the engine that drives the California economy, and they are the engine that will revive that economy and enable it to meet the 21st century and its challenges head-on.

The advanced networking that CENIC provides is necessary to bring that transformation about, and this is a responsibility that we who have the good fortune to serve you take very seriously. The networking that CENIC provides will continue to help attract the highest quality faculty, staff, students, and funding to remain at the vanguard of innovation, prepare students for the rapidly evolving landscape that will greet them upon graduation, and empower them and the faculty and staff of their institutions to improve upon that landscape. It's a daunting challenge to be sure but one that we all relish, and on behalf of our staff and myself, I would like to personally thank you all for the opportunity you have given us to play a part in it.

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the cenic board of directors

Board Officers:
David Ernst, Chair
Associate Vice President and Chief Information Officer
UC Office of the President

Patrick Perry, Vice Chair
Vice Chancellor
California Community College System Office

Todd Finnell, Secretary
Asst. Superintendent
Imperial County Office of Education

John Charles, Treasurer
Chief Information Officer
CSU East Bay

K-12 Board Representatives:
Don McNelis
Superintendent
Butte County Superintendent of Schools

Keric Ashley
Director, Data Management Division
California Department of Education

CCC Board Representatives:
Catherine McKenzie
Director, Technology Unit
California Community College System Office

Robert Owen (before 8/11/09)
Assoc. Vice President, Information Technology
Cabrillo College

Deborah Ludford (as of 8/11/09)
District Director, Information Services
North Orange County Community College District

CSU Board Representatives:
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President
Sonoma State University

Michael McLean (before 10/23/09)
Interim Assistant Vice Chancellor, Information Technology
        Services
CSU Chancellor's Office

Amir Dabirian (as of 10/23/09)
Asst. Vice Chancellor, Information Technology Services
        and Chief Information Officer
CSU Chancellor's Office

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Vice Chancellor, Information Technology & Chief
        Information Officer
UC San Francisco

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Stanford University

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

Ilee Rhimes
Vice Provost, Information Technology Services and Chief
        Information Officer
University of Southern California

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Larry Smarr
Director
California Institute for Telecommunications & Information
        Technology
UC San Diego

Ron Johnson
Vice President & Chief Technology Officer
University of Washington

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.

the cenic committees & councils

Audit Committee:
Don McNelis, Chair
Doug Hartline
Mark Crase, CSU
Todd Finnell
Catherine McKenzie

Finance Committee:
John Charles, Chair
Doug Hartline
Keric Ashley
Elazar Harel
Patrick Perry
Sam Steinhardt, Stanford University
Trevor Stewart, Butte County Office of Education
Jim Dolgonas, *Ex Officio*

XD/HPR Committee:
John Dundas, Chair
John Silvester
Larry Smarr
Ron Johnson
Christine Haska, Naval Postgraduate School
Jim Davis, UCLA
Greg Hidley, UC San Diego
Tom Hutton, UC San Diego
Tom DeFanti, UC San Diego
Rodger Hess, UC Davis
Peter Siegel, UC Davis
Russ Hobby, UC Davis
Jim Dolgonas
Dave Reese
Brian Court

Chair, HPR Network Technical Advisory Council
Rodger Hess (through 12/31/2009)
Campus Network Architect
UC Davis Communications Resources

Tom Hutton (as of 1/1/2010)
Network Architect, San Diego Supercomputer Center
UC San Diego

DC Network Technical Advisory Council
Deborah Ludford (through 12/31/2009)
District Director, Information Services
North Orange County Community College District

Jeremy Powell (as of 1/1/2010)
Manager, Technical Services
San Bernardino County Superintendent of Schools

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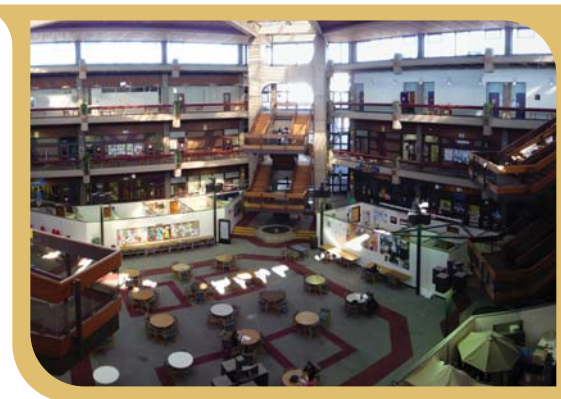Information Technology Services
UC Santa Cruz

the cenic core values & guiding principles

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.

2009-10 cenic associates

california k12 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 County DoE
Placer COE
Plumas COE
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 community colleges

CCC Chancellor's Office
CCC Chancellor's Office Data Center
Alameda
Allan Hancock
American River
Antelope Valley
Bakersfield
Barstow
Berkeley City
Butte
Cabrillo
Canyon Country Education Center

Cañada
College of the Canyons
Cerritos
Cerro Coso
Chabot
Chaffey
Citrus
Coastline
Columbia
Compton
Contra Costa
Copper Mountain
Cosumnes River
Crafton Hills

Cuesta
Cuyamaca
Cypress
De Anza
Desert
Diablo Valley
East Los Angeles
El Camino
Escondido Education Center
Evergreen Valley
Feather River
Folsom Lake
Foothill

Fresno City
Fullerton
Garfield Center
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 College
Moorpark
Mt. San Antonio
Mt. San Jacinto
Napa Valley
North Orange County CCD

Ohlone
Orange Coast
Oxnard
Palomar
Palo Verde
Pasadena City
Porterville
Redwoods
Reedley
Rio Hondo
Riverside
Sacramento City
Saddleback
San Bernardino Valley
San Diego Centers for Education
    and Technology
San Diego City
San Diego Mesa
San Diego Miramar
San Francisco City
San Joaquin Delta
San Jose City

San Mateo
Santa Ana City
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

california state university

CSU Chancellor's Office
CSU Office of Advocacy and
    State Relations
California Maritime Academy
California State Polytechnic
    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
CSU Stanislaus Stockton Center
Humboldt State University
Moss Landing Marine
    Laboratories
San Diego State University
San Francisco State University
San Jose State University
Sonoma State University

university of california

UC Office of the President
UC Office of State
    Governmental Relations
UC Berkeley
Lawrence Berkeley National
    Laboratory

UC Davis
UC Irvine
UC Los Angeles
UC Merced
UC Riverside

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

charter private universities

California Institute of Technology
    Jet Propulsion Laboratory

Stanford University
    Stanford Hopkins Marine
        Station
    Stanford Linear Accelerator
        Center
    Stanford Medical Center

University of Southern California
    Health Sciences Campus
    Information Sciences Institute

2009-10 cenic associates

calREN associates

Carnegie-Mellon University West
Chapman University
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

the cenic mission

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.

cenic professional relationships

educause

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.

association of pacific rim universities

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.

internet educational equal access foundation

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), colocation 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.

cenic networking relationships

internet2

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.

national lambdarail inc.

National LambdaRail, Inc. 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.
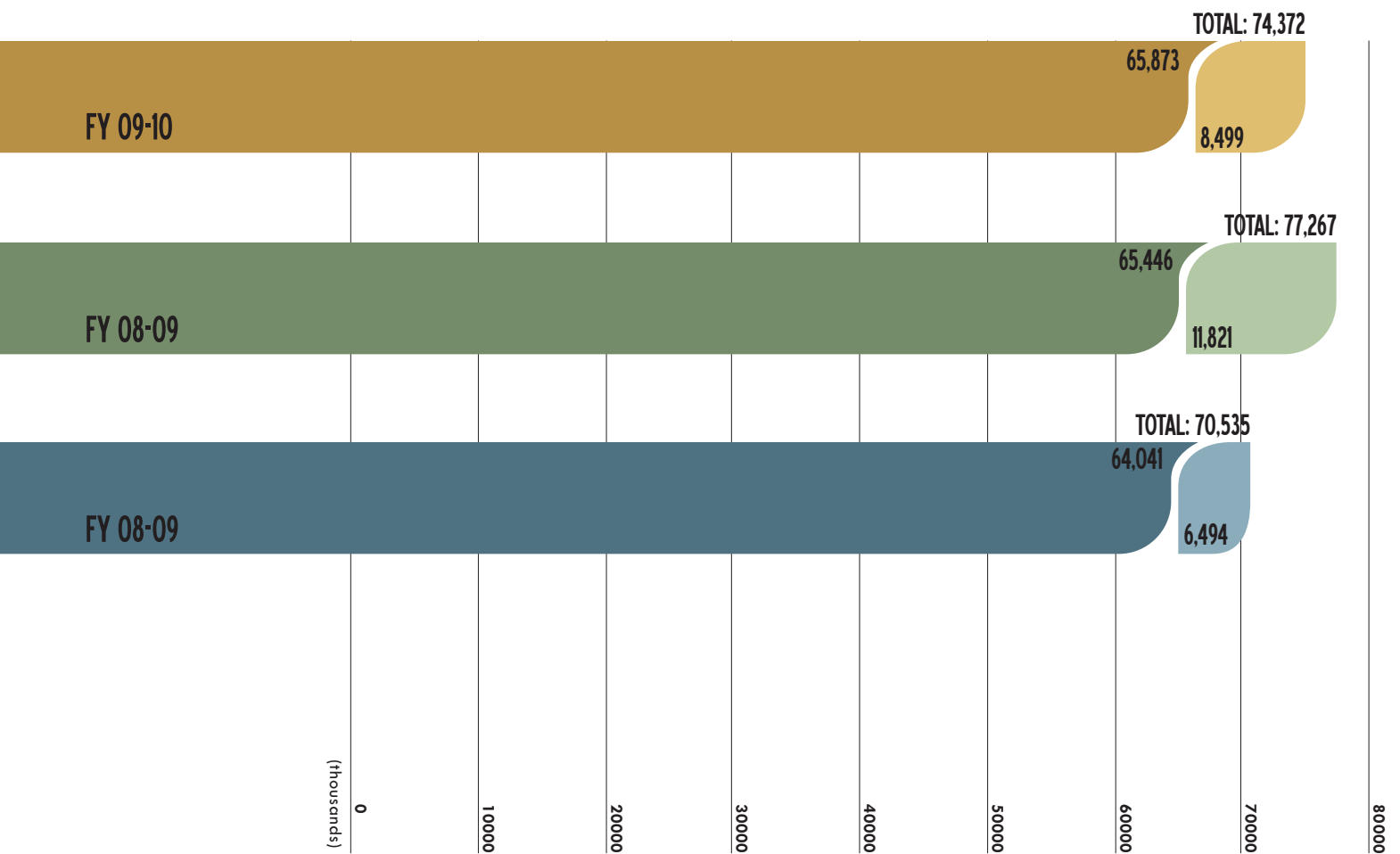
The defining characteristic of the NLR infrastructure is its ability to support many distinct networks for the US research community using the same core infrastructure. Experimental and production networks exist side-by-side but are physically and operationally separate. Production networks support cutting-edge 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.

western regional network

In 2010, Pacific Northwest GigaPoP, Front Range GigaPoP, the University of New Mexico, and CENIC announced the formation of the Western Regional Network, a multi-state partnership to ensure robust, advanced, high-speed networking availability for research, education, and related uses through the sharing of network services. These RONs provide networking services to the following states: Alaska, California, Colorado, Idaho, Montana, Nevada, New Mexico, Washington, Hawaii, Oregon, and Wyoming.

WRN will provide access to shared NLR, Internet2, PacificWave, and other regional fiber- and IP-based services for instruction, research, medical education and clinical care, and economic development purposes.

2009-10 financial statement

	FY 07-08	FY 08-09	FY 09-10
Total Assets:	70,535	77,267	74,372
Liabilities:	6,494	11,821	8,499
Net Assets:	64,041	65,446	65,873

TOTAL: 74,372

FY 09-10 — 65,873 — 8,499

TOTAL: 77,267

FY 08-09 — 65,446 — 11,821

TOTAL: 70,535

FY 08-09 — 64,041 — 6,494

(thousands)

0 — 10000 — 20000 — 30000 — 40000 — 50000 — 60000 — 70000 — 80000

2009-10 calREN network updates

The Golden State's public and private research and education institutions are some of the best in the world and continue to attract top talent in all areas of human endeavor. As well as the human atmosphere of teamwork and innovation, part of that attraction is the resources available to top educators and researchers with which they can realize their innovations on a global scale.

CalREN is one of the most significant of these resources, and it's CENIC's responsibility to see that it remains that way.

In effect, California has two Internets. The first is used by people every day to surf the Web, stay in contact with friends and family, conduct business, and consume and produce all forms of entertainment. The second is CalREN, an ultra-high-performance optical network for the exclusive use of the state's research and education institutions which is owned and operated on behalf of that community by CENIC, the nonprofit Corporation for Education Network Initiatives in California.

With nearly 3,000 miles of high-capacity optical fiber and 17 major backbone nodes spanning the state, hundreds of optical components, and nearly 500 leased circuits from telecommunications companies to complete middle- and last-mile connections to CENIC member institutions, CalREN empowers innovations in all areas of research as well as creative teaching and learning solutions that can extend the reach of the state's research and education professionals around the world at lightspeed.

CalREN is designed to allow three separate and independent network tiers to operate simultaneously over a single infrastructure, permitting bleeding-edge research to take place over the same network that serves the daily needs of nearly ten million Californians. This research can push the network to or even beyond tolerances without fear of interrupting service to users on other tiers.

calREN-dc: digital california

Used for day-to-day network activities such as accessing the web, e-mail, and high-quality video-conferencing 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.

calREN optical refresh:

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 2009-10 fiscal year, this process was completed for the entire backbone with the replacement of optical gear on the Bay Area and Central Valley Routes, and the migration of customer traffic to the new equipment.

With the completion of this refresh, the previous route definitions (see map) have changed, with the network path from Los Angeles to Riverside, through the Central Valley to Sacramento, Oakland, and Sunnyvale becoming a single route, the Inland Route.

calREN-dc refresh:

The refresh of routers underlying the CalREN-DC network tier was completed during the 2008-09 fiscal year, and the 2009-10 fiscal year saw the migration of customer traffic to the new routers. With the completion of this project, the backbone bandwidth of this network tier, used by CENIC Associates for day-to-day activities, increased fourfold from 2.5 Gb/s to 10 Gb/s.
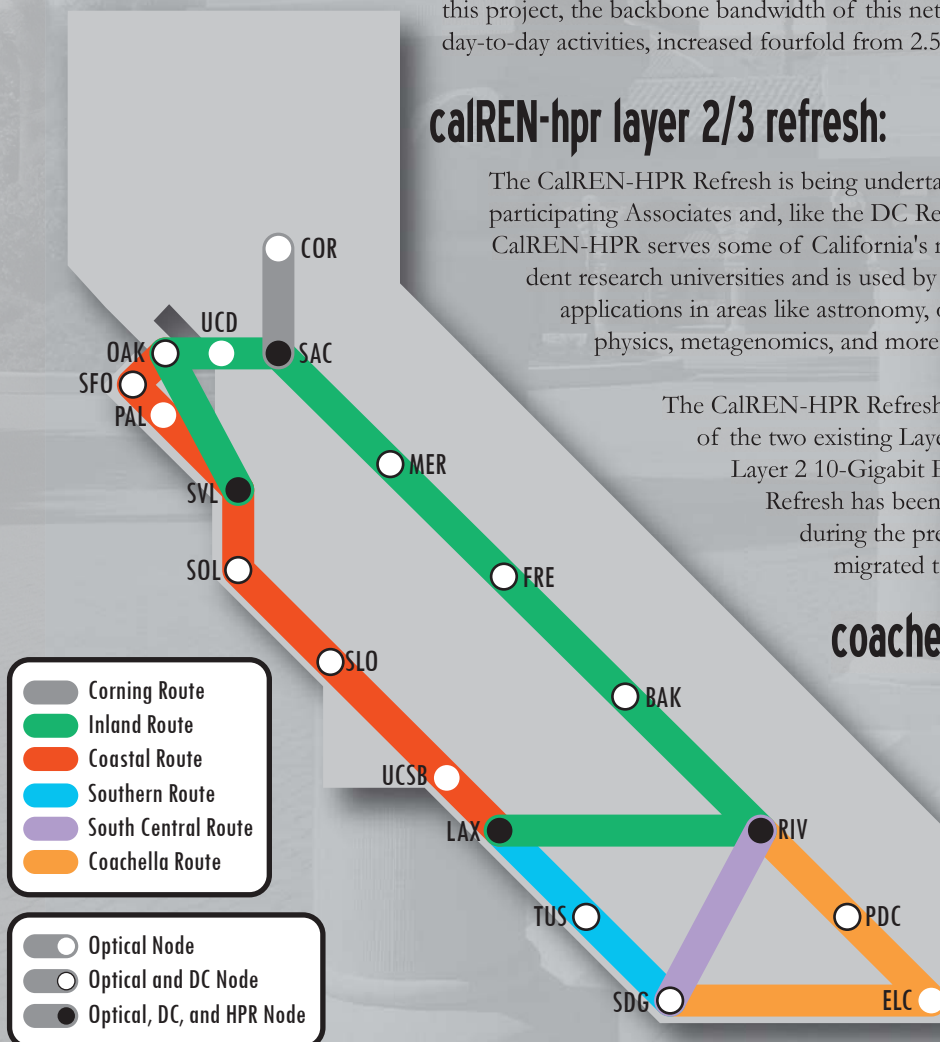
calREN-hpr layer 2/3 refresh:

The CalREN-HPR Refresh is being undertaken to provide additional services to participating Associates and, like the DC Refresh, to "future-proof" the network. CalREN-HPR serves some of California's most prestigious public, private, and independent research universities and is used by them to support high-performance research applications in areas like astronomy, oceanography, high-energy and particle physics, metagenomics, and more.

The CalREN-HPR Refresh is being undertaken in two parts: a refresh of the two existing Layer 3 (routed) network and the addition of Layer 2 10-Gigabit Ethernet switching services. The Layer 3 Refresh has been completed as new routers were installed during the previous fiscal year, and Associates have been migrated to this new equipment in 2009-10.

coachella valley upgrade

This project will upgrade the Coachella Valley Route, a ring which extends from San Diego to Riverside through El Centro, Yuma, and Palm Desert, to provide 10GE connectivity throughout that region. In addition, this project will create a second regional aggregation point in the San Diego metropolitan area, which will allow sites in that area to connect to diverse hubsites cost-effectively. Completion is expected during 2010.

COR
UCD
OAK
SAC
SFO
PAL
MER
SVL
SOL
FRE
SLO
BAK
UCSB
LAX
RIV
TUS
PDC
SDG
ELC

Corning Route
Inland Route
Coastal Route
Southern Route
South Central Route
Coachella Route

Optical Node
Optical and DC Node
Optical, DC, and HPR Node

associate updates by segment

california k12 system

For the past several years, CENIC has carried out an ongoing upgrade to the circuits and ring topologies by which California's K12 System node sites connect to one another and CalREN. During the 2009-10 fiscal year, the following circuit upgrades were carried out between K12 node sites and CalREN Backbone Nodes (BN) or other K12 node sites.

K12 Node Site	Connection Speed
Tulare County Office of Education	Gigabit
Madera County Office of Education	Gigabit
Loyalton High School	DS-3
Ventura County Office of Education	Gigabit
Merced County Office of Education	Gigabit
Los Angeles Unified School District	10 Gigabit
Orange County Department of Education	10 Gigabit
San Diego County Office of Education	10 Gigabit

california community colleges

CENIC has also undertaken a program of upgrades and redesign to improve connectivity, reliability, and cost-effective service for California's Community Colleges and their various off-site centers. As part of this effort, CENIC has implemented the following circuit upgrades, noted in green, between CCC sites and CalREN Backbone Nodes during the 2009-10 fiscal year. As this list demonstrates, many of the sites listed below gained diverse connectivity to CalREN in 2009-10.

In addition to the following upgrades and new connections, 2009-10 also saw connectivity to CalREN for several other sites of interest to California's Community College System, including Abtech Systems (disaster recovery provider for the Foothill DeAnza CCD), the CCC Chancellor's Office Sacramento Data Center, and the Glendale CCD Office Skills Center.

CCC Campus or Site	Primary Connection	Alternate Connection
Antelope Valley College	Gigabit	DS-3
Berkeley City College	Gigabit	DS-3
Cañada College	Gigabit	DS-3
Canyon Country Education Center	Gigabit	DS-3
Citrus College	Gigabit	DS-3
College of Alameda	Gigabit	DS-3
Contra Costa College	Gigabit	DS-3
Diablo Valley College	Gigabit	DS-3
Foothill College	Gigabit	DS-3
Glendale College	Gigabit	DS-3
Hartnell College	Gigabit	DS-3
Marin CCD Indian Valley Campus	Gigabit	DS-3
Imperial Valley College	Gigabit	DS-3
Laney College	Gigabit	DS-3
Las Positas College	Gigabit	DS-3
Long Beach City College	Gigabit	DS-3
Los Angeles Mission College	Gigabit	DS-3

CCC Campus or Site	Primary Connection	Alternate Connection
Los Medanos College	Gigabit	DS-3
Merced College	Gigabit	DS-3
Miramar College	Gigabit	DS-3
Mission College	—	DS-3
Mt. San Antonio College	Gigabit	DS-3
Napa Valley College	Gigabit	DS-3
North Orange County CCD	Gigabit	DS-3
Ohlone College	Gigabit	DS-3
Pasadena Area CCD	Gigabit	DS-3
Peralta CCD Office	Gigabit	DS-3
Rio Honda College	Gigabit	DS-3
San Joaquin Delta College	Gigabit	DS-3
Santa Barbara City College	Gigabit	DS-3
Shasta College	Gigabit	DS-3
Skyline College	Gigabit	DS-3
Solano CCD	Gigabit	DS-3
Victor Valley College	Gigabit	DS-3
West Hills College	Gigabit	DS-3
West Hills College Lemoore	Gigabit	DS-3

california state university

CSU Campus or Site	Connection Speed
Office of Advocacy and State Relations	DS-3
Office of Federal Relations	100 Mb/s

university of california

UC Campus or Site	Connection Speed
UC Santa Cruz Extension	Gigabit
UC Santa Cruz	10 Gigabit
UCLA	10 Gigabit
UC Berkeley	10 Gigabit
UC Berkeley	Two Gigabit
UC Office of the President	10 Gigabit
UC San Diego	Two 10 Gigabit
UC San Diego	10 Gigabit

non-charter associates

Associate Site of Interest	Connection Speed
Jet Propulsion Laboratory - Harvey Mudd College	10 Gigabit
Chapman University	500 Mb/s
NPS Center for Asymmetrical Warfare	Gigabit

CalREN Boosts Research-Heavy California Cities to Top of the List for Internet Connection Speed Worldwide

"a nearby university can drive demand and growth of broadband beyond the campus in relatively well-developed areas."

With the release of the fourth quarter 2009 State of the Internet report from Akamai, the verdict came in: California research and education networking helped to put three California cities at the top of the worldwide list for connection speed and unique IP counts. Berkeley, CA was found to be the speediest city on Earth for Internet connections, and the number 3 spot was held by Stanford, CA. (In second place was Chapel Hill, NC.) Taking unique IP counts as the benchmark as opposed to connection speed, San Diego, CA came up as number two behind New York.

Both Berkeley and Stanford are of course homes to two of the top research universities in the world, UC Berkeley and Stanford University, while San Diego is home to another such mecca for research and education, UC San Diego. All three universities, along with the rest of California's K-20 public research and education community, are members of CENIC.

Given that all of the top ten cities for connection speed are associated with strong research and higher education presences, the positive effect for any area of having a high-quality research university nearby is quite clear, especially when that university is connected to an ultra-high-performance network like CENIC's CalREN. This effect is noted explicitly in the Akamai report released on April 21, 2010, which states that, "[in the 2009 third quarter report] it was noted that many of the top cities listed for the United States had one or more colleges/universities within, or close to, the city. [T]he results once again show [...] that so-called "college towns" (cities) are some of the best connected in the United States," more so than even otherwise extremely highly-connected metropolitan areas like New York, Chicago, or Los Angeles. The report went on to speculate that in such areas, "the speed of local consumer broadband offerings is potentially higher than average."

The report's list of most highly-connected cities did, however, indicate that a nearby university can drive demand and growth of broadband beyond the campus in relatively well-developed areas. In remote and underserved areas, though, the advanced level of connectivity enjoyed by a nearby educational institution is less likely to spread beyond the campus. This finding reinforced the need for continued investment in broadband infrastructure in rural and remote areas and a National Broadband Plan such as that published by the Federal Communications Commission to ensure that the benefits of broadband are available to all citizens regardless of where they live.

"Data seem to support the conclusion that high-speed networking for advanced research and education can help drive the availability of higher-performance consumer telecommunications services, but this seems to be more the case in urban areas than rural or other underserved areas, pointing to the need for subsidies of some sort being required in these areas," says CENIC President & CEO Jim Dolgonas.

The State of the Internet for the fourth quarter of 2009 can be downloaded with a free registration from Akamai's website at http://www.akamai.com/stateoftheinternet/.

the network operations center

The CalREN network itself is tailored for the Golden State's research and education community, enabling production-level uses simultaneously with the most pioneering network-based research over the same infrastructure. CENIC's 24/7/365 Network Operations Center or NOC is also optimized for the needs of the community CENIC serves. The NOC functions as the primary customer interface for our user community for all services provided over CalREN. This function includes responding to abuse complaints and coordinating service upgrades to sites, and planning and communicating maintenance events.

Since the same community that CENIC serves also provides governance, customer feedback is of particular value to us. To this end, CENIC has designed a Network Operations Center Service Interaction survey, a link to which is included in every e-mail correspondence sent by the NOC to CENIC customers upon resolution of each support request and maintenance ticket. Since its inception in 2005, 508 responses have been tallied, and customers continue to express a high degree of satisfaction in the services provided by the CENIC NOC as measured by the rates of agreement with the following statements:

The CENIC NOC Representative I worked with ...	% Agreement
... understood my problem.	96%
... handled my problem with an appropriate level of urgency.	95%
... followed through with requested information.	95%
... confirmed that I was satisfied with the resolution.	95%
The response time for my support request was faster than or met my expectations.	93%
Communications regarding the status of my support request were timely.	95%
The time to resolution for my support request was faster than or met my expectations.	94%
I am satisfied or very satisfied with the NOC's handling of my support request.	94%

"The CENIC NOC proactively contacted the customer ... "

"The NOC is great!"

"CENIC was on top of their game."

However, the Operations Engineers that staff the NOC do a great deal more than monitor the CalREN network tiers and respond to customer contacts. The technical functions performed by the CENIC NOC include:

Administering the optical (Layer 1), Ethernet (Layer 2), and routing (Layer 3) components of all three CalREN network tiers, as well as Layer 1 (fiber and optronics) support for National LambdaRail.

Diagnosing & Resolving equipment failures and aiding in the decommissioning of retired equipment across the entire CalREN network, and

Performing needed tasks in support of circuit installations and backbone upgrades listed in this Annual Report.

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.

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.

In early 2010, CENIC and Imperial County Office of Education began making plans to combine their two videoconference services into a single statewide videoconferencing infrastructure, K20Video, consisting of multipoint control units (MCUs), a real-time, online conference scheduling system, gatekeepers and proxy servers, and 24/7 support of videoconferences. Through K20Video.org, Videoconference Administrators (VAs) at campuses will be able to schedule and manage their own videoconferences, modify conferences, record conferences for viewing at a later date, and provide live Webcasts of conferences.

Additional information about K20Video can be found at: http://k20video.org/.

In the 2009-10 fiscal year, approximately **2,000** scheduled videoconferences were held using CVS, representing approximately **17,500 port hours** of videoconference activity. Peak usage continues to occur at mid-semester (April and October).

Academic use remains strong, and is especially important in providing educational opportunities to students in rural areas without traditional access to programs. The vast majority of scheduled conferences held in 2009-10 were academic (**81%**). Anecdotal evidence suggests the actual number of academic videoconferences held is significantly higher than reported through the CVS Scheduling Desk, since a large number of point-to-point conferences, which are conducted directly between two sites, take place during the year but are not included in our statistics.

Videoconferencing also remains a valuable resource for conducting administrative business between campuses, especially given the travel constraints being faced by educational institutions. Administrative videoconferences represented **19%** of all conferences scheduled (an increase of **3%** from last year).

beyond california: national and worldwide networking

CENIC was created by California's research and education community not only to provide the advanced networking that would enable them to communicate with one another, but also to facilitate the relationships that would allow them to work together with colleagues worldwide.

Eastward connectivity across the Atlantic Ocean and on to Europe is provided through the high-bandwidth connections that CalREN has to the national networks of National LambdaRail, Inc. (NLR) and Internet2. Looking westward and within North America as well, connectivity to the many international research and education networks is provided via the geographically distributed peering facility Pacific Wave. A joint project of CENIC and the Pacific Northwest GigaPoP with the support of the University of Washington and the University of Southern California, Pacific Wave features multiple connection points in Sunnyvale, Los Angeles, and Seattle, WA. At these points, 27 participating networks in 11 countries throughout the Pacific Rim and beyond come together, including two combined networks — the Latin American redCLARA and the Asian TransPAC2 — which connect a total of 17 and 11 countries respectively.

Pacific Wave Network Participant	Nation(s)	Seattle	Los Angeles	Sunnyvale
AARNet	Australia	•	•	
CA*net4	Canada	•		
CalREN	United States		•	•
redCLARA	Latin America*		•	
CUDI	Mexico		•	
Defense Research and Engineering Network (DREN)	United States	•	•	
Energy Science Network (ESnet)	United States	•		•
GEMnet	Japan	•		
Google	United States	•	•	•
KAREN	New Zealand	•		
Internet2	United States	•	•	
JGN2Plus	Japan		•	
KREONet2/KOREN	Korea	•		
Los Nettos	United States		•	
Microsoft Corporation	United States	•		
National LambdaRail	United States	•	•	
NII/SINET	Japan		•	
NASA Research and Education Network	United States			•
NUS-Gigapop	Singapore		•	
Pacific Northwest GigaPoP	United States	•		
Qatar Foundation	Qatar		•	
Softbank Telecom	Japan		•	•
T-LEX	Japan	•		
TransPAC2	Pacific Rim**		•	
TWAREN	Taiwan		•	
UltraLight	United States		•	
ThaiREN	Thailand		•	

* Participating countries: Argentina, Bolivia, Brazil, Colombia, Costa Rica, Cuba, Chile, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Panama, Paraguay, Peru, Uruguay, Venezuela
** Participating countries: Japan, Korea, China, Philippines, Hong Kong, Vietnam, Thailand, Malaysia, Singapore, Indonesia, Pakistan

pacific wave and transitrail distributed peering facilities
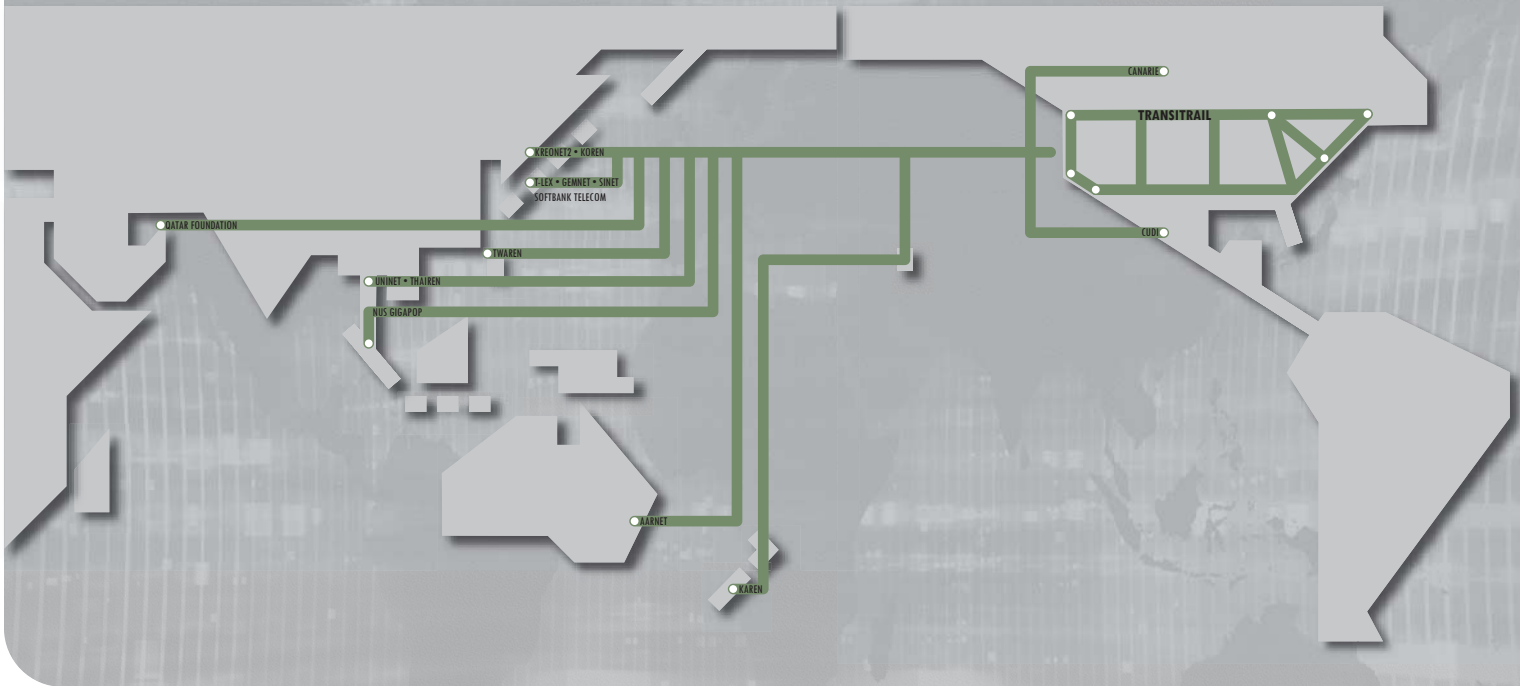
In addition to the Pacific Wave distributed international peering facility, CENIC, the Pacific Northwest GigaPoP, and Internet2 also operate the TransitRail commodity peering service (TR-CPS) a national peering facility. TR-CPS uses the transport and services of Internet2 and NLR for its backbone infrastructure and participant access. With six exchange points widely spaced across the US, TR-CPS enables its participants to leverage connectivity to the national networks of Internet2 and NLR to offer substantial cost savings and improved performance to their network users.

Exchange points, shown above, are located in Los Angeles and Palo Alto, CA; Chicago, IL; New York, NY; Ashburn, VA; and Seattle, WA. Current participants include:

3ROX
AMPATH
Arkansas Research and
    Education Optical Network
BOREAS-Net
CENIC
Clemson/South Carolina
    Gigapop
Drexel
Education Networks of
    America
Florida LambdaRail
Front Range Gigapop
Great Plains Network
Indiana Gigapop
Kansas Research & Education

Network
Kentucky Regional Optical
    Network
Louisiana Optical Network
    Initiative
North Carolina Research &
    Education Network
Merit Network
Mid-Atlantic Crossroads
Mid-Atlantic Gigapop in
    Philadelphia
MidAtlantic Terascale
    Partnership
Metropolitan Research &
    Education Network
Northern Crossroads

Northern Lights
OARnet
OneNet
Oregon GigaPOP
Pacific Northwest GigaPoP
Southern Crossroads
University of Illinois at
    Chicago / ICCN
University of Illinois at
    Urbana-Champaign
University of Iowa
University of Memphis
Utah Education Network
WiscNet

advanced networking for a fragile world: pacific wave at sc09

From November 16-19, the Oregon Convention Center in Portland, OR hosted cutting-edge network-based experiments and demonstrations as part of this year's Supercomputing Conference, SC09. The conference has built a reputation for revolutionary demonstrations and challenges, as well as a top-flight technical program, bringing together the best and brightest researchers and exhibitors in the world of high-performance computing, networking, storage, and analysis.

Pacific Wave is a distributed international network peering exchange facilitating some of this ground-breaking research. At Booth 451 on the SC09 show floor, researchers in the fields of ocean observatories and sustainable computing showcased innovations made possible by the global advanced networking provisioned by Pacific Wave and other advanced networks, all of vital importance to our changing planet. Presenters included University of Washington researcher and TED talk alumnus John Delaney speaking on next-generation ocean science, and Calit2@UCSD's Tom DeFanti, who discussed the applications of globally shared visualization in his talk called "Better Than Going There."

Pacific Wave has been an integral contributor to Supercomputing events since its inception in 2004 and has supported many 'world's first' research programs and record-breaking Bandwidth Challenge activities. Groups which have benefited from Pacific Wave's close affiliation with Supercomputing in past years include AARNet, KREONet2, University of Tokyo, Caltech/Ultralight, EVL, Optiputer, GEMNET, and the University of Washington. SC09 was no different, with Pacific Wave facilitating connectivity for demonstrations by the University of Tokyo, Caltech, the Korean advanced networks KREONet2/KISTI, and the Japanese advanced networks GEMNET/JGN2/NICT.

Previous SC conferences have also benefited from Pacific Wave's networking support, including SC08 in Austin, TX and the previous year's conference in Reno, NV. Such support has consisted of providing extremely high bandwidth networking resources to the show floor itself, and provisioning such resources across its own internal infrastructure to support demonstrations by Pacific Wave members worldwide.

CENIC's National LambdaRail Layer 1 engineering group also helped implement 18 10 Gigabit WAN circuits to the showfloor in Portland from various points on the NLR network infrastructure.

the future is now: uc santa cruz

On April 5, 2010, the University of California, Santa Cruz, community leaders, and the Corporation for Education Network Initiatives in California (CENIC) celebrated completion of the final link in the "Fiber to the Future" project that achieves a 10-fold increase in the campus's connection to CENIC's ultra-high-speed research and education network serving the state's education and research institutions.

The new fiber-optic connection links the UC Santa Cruz campus to CalREN via CENIC-owned fiber, bringing ultra-high-speed Internet performance to the university and giving UCSC faculty, staff, and student researchers a tenfold speed improvement in their previous access to CalREN.

"The upgrading of our telecommunications infrastructure moves us to the competitive edge in network connectivity, with network capabilities that rival those found anywhere," said UC Santa Cruz Chancellor George Blumenthal. "This new era on campus also ushers in a new era for the community, because this improved network is a shared resource."

"High-bandwidth networking of this type is a big draw for the best faculty and is an absolute requirement for some research grants, as well as enabling cutting-edge research," said CENIC President & CEO Jim Dolgonas. "Distributed research is often impossible without such networking, and these concerns are all a big part of UC Santa Cruz. This new connection will play a crucial role in that. We are pleased to have been able to complete this important project for the campus."

On the UCSC campus, the high-speed connection will benefit research in the sciences, engineering, social sciences, arts, and humanities. It will support the international Human Genome project, enable astrophysicists to share data intensive models of the universe with other researchers, and power dance collaborations where performers at UCSC interact with and respond in real-time to artists in other venues.

During the celebration at the Engineering 2 building on the UCSC campus, professors Sandra Faber, astronomy, and Ted Warburton, arts, demonstrated some of the amazing new research and collaborative capabilities of the high speed connection.

project background: "fiber to the future"

Launched in January 2008, the Fiber to the Future project entailed stringing more than 50 miles of fiber-optic cable from the Silicon Valley to the UC Santa Cruz campus. Additional cable was extended to UCSC facilities at 2300 Delaware Ave. where they serve as a tie-in point for the Santa Cruz County community. The approximate $5 million investment was funded by UCSC and the UC Office of the President.

The high-speed network connection gives campus researchers greatly increased bandwidth and capabilities for dedicated connections to the campus's Silicon Valley Center located at NASA's Ames Research Center.

The dedicated link also protects the campus and community from reliance on commercial networks such as one well-known disruption where severed cables in South San Jose cut telephone and Internet service for tens of thousands of Central Coast residents.

the 2010 cenic annual conference: full speed ahead in monterey

Distributed dance performances united across continents. Digital media installations made possible with extremely high-definition video and sound. Detailed discussions of the regional and international networks that make it all possible. Green and sustainability issues and how advanced networking can play a crucial role in meeting the challenges they raise. A visit to the campus of the Naval Postgraduate School.

FULL SPEED AHEAD, the CENIC 2010 annual conference offered all of this and more. The Research & Technology breakout sessions offered detailed presentations on advanced networking and computing research. The Teaching & Learning breakout sessions featured the latest in Science, Technology, Engineering, and Math (STEM) education, videoconferencing, language and cultural learning, and disaster recovery innovations. In addition, conference attendees were treated to a live CineGrid demo, a national R&E BoF session featuring Internet2 and NLR, and presentations from all of the 2010 Innovations in Networking Award winners.

On Monday morning Ted Warburton of UC Santa Cruz demonstrated artistic applications using high-bandwidth networks to create distributed live arts performances, uniting artists and engineers in eye-catching examples of "the crossroads of arts and emerging technologies." Next, David Lassner of the University of Hawaii provided his perspective on the challenges of international networking. The morning concluded with a Keynote Address by the FCC's Education Director, Steve Midgley, wherein he discussed the realities of broadband networking in its current state and speculated on the future direction cyberinfrastructure needs to take in order to drive broadband utility in education.

Monday afternoon and evening were spent at the Naval Postgraduate School (see page 28), and Tuesday's program began with a presentation by Herbert Enns of the University of Manitoba on digital media installations enabled by advanced networks, followed by a panel discussion on regional networking, featuring CUDI (Mexico), FLR (Florida), BCNet (British Columbia), and UEN (Utah). Ed Lazowska, the University of Washington's Gates Chair in Computer Science & Engineering, provided the second Keynote Address of the conference, with a thought-provoking talk on broadband and the role of higher education and the advances that enable eScience. Immediately after the Innovations in Networking awards luncheon, the awardees gave presentations on their work. The afternoon proceeded with breakout sessions in Teaching & Learning, and Research & Technology, and concluded with a CineGrid demonstration and a Birds of a Feather session on national R&E networking featuring speakers from Internet2 and National LambdaRail, Inc.

The focus on Wednesday was on sustainability with Debbie Montano of Juniper Networks presenting on green networking, and sustainability guru Bill St. Arnaud presenting remotely via Cisco TelePresence on models to empower California's research and education community to reduce its carbon footprint.

regional networks panel
Click to Watch

cinegrid demonstration
Click to Watch

Of course, no CENIC conference would be complete without the ability to engage in "human networking," and FULL SPEED AHEAD provided ample opportunities in the beautiful Monterey setting for discussions with colleagues, as well as opportunities to chat with the corporate sponsors who were happy to showcase their own innovations to this targeted community.

With the help of Gold Sponsor NCast, CENIC was able to deliver the entire CENIC 2010 annual conference via live Webcast to members of the community who were unable to attend in person. Through live chat, remote attendees retained the ability to ask questions of presenters during Q&A. By webcasting the entire conference, CENIC enabled even more members of that community to benefit from the presentations and demonstrations on teaching and learning as well as the latest in network research.

And the archived video ensures that the CENIC annual conference will continue to offer benefits to the California research & education community and beyond all year round! Archived video of all presentations is now available at the conference website. Slides for many presentations are online as well, so Associates and others can enjoy the CENIC Annual Conference from home or office.

breaking out and coming together: teaching & technology

As well as the top-flight general session presentations, this year's Innovations in Networking Award Winners, and the program at the Naval Postgraduate School, the 2010 CENIC Annual Conference featured rich breakout sessions in Teaching & Learning and Research & Technology, touching on topics of relevance to all attendees. This year, the complete conference webcast means that the insights gained in these sessions can continue to benefit the CENIC community and beyond. Examples of these archived presentations are given below.
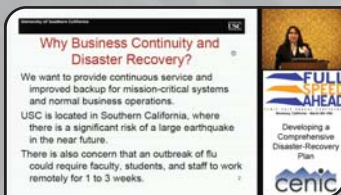
### developing a comprehensive disaster recovery plan • adele shakal, usc

click to view   An overview of a multifaceted approach to business continuity and disaster recovery. Components include business-impact analysis, mapping interdependencies, establishing remote DR sites, and helping to engage the entire university community in the planning process.

networking and collaboration in maritime interdiction operations • alex bordetsky, nps

click to view   In the core of Tactical Network Topology (TNT) and Maritime Interdiction Operation (MIO) experimentation is a unique testbed, which enables sustainability and evolution of the campaign. It is based on the plug-and-play sensor-unmanned systems networking capabilities combined with global reachback to the remote expert/command sites.
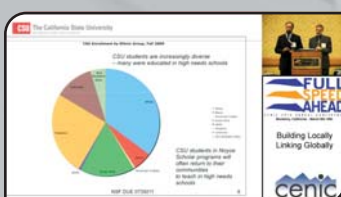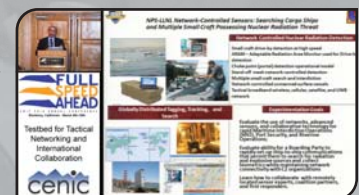
building locally, linking globally: networking science and math teachers • john ittelson, george station, csumb jennifer bradford, csuf

click to view   Discussing networking of micro-communities of new science and math teachers using the National Science Digital Library to advance instructional excellence in high-need schools.

2010 innovations in networking award winners

Four groundbreaking projects that focus on the innovative use and expansion of high-performance networking were honored by CENIC as recipients of the 2010 Innovations in Networking Awards.

The awards are given annually by CENIC to highlight exemplary innovations that leverage ultra high-bandwidth optical networking, particularly where those innovations have the potential to revolutionize the ways in which instruction and research are conducted or further the deployment of broadband in underserved areas. The award presentation ceremony took place at the CENIC Annual Conference, "Full Speed Ahead," in Monterey on March 8-10, 2010.

high-performance research applications – Enhancing Student Exchange Experiences

Monash University in Australia and UC San Diego have added high-definition videoconferencing to their respective exchange programs, enabling transformative experiences for students and faculty. HD video allows mentors at UCSD to attend final student seminars that are presented both to audiences at Monash and their mentors at UCSD concurrently. Thus, they receive feedback from both Monash and UCSD mentors, significantly enhancing the outcomes of their internship. Likewise, Monash students at UCSD present final seminars back to their mentors in Australia while presenting to a local audience at UCSD.

click to view awardee presentation

The first groups of students to benefit from this use of HD videoconferencing were UCSD students spending Summer 2009 at Monash as part of the NSF- and Calit2-funded Pacific Rim Experiences for Undergraduates (PRIME) program, and a similar program that sent four Monash students to UCSD last winter under the Monash Undergraduate Research Projects Abroad (MURPA) program. Monash University's program goes a step further by adding an advanced seminar scheme, in which students attend seminars given by world leading experts before they depart Australia.

Monash's Chancellor, Dr Alan Finkel, wrote recently of his experience attending one of these seminars, "I've participated in numerous video conferences to date but nothing like this. The quality was so high that the experience was almost as if we were all in the same room."

experimental/developmental applications – Scalable, Energy-Efficient Datacenters

One of the most interesting and potentially revolutionary outcomes of the development of the Internet is the ability gained by every person on Earth to generate enormous amounts of data, a large portion of which must be stored in datacenters. With major drivers such as Google and others entering this arena, the proliferation of datacenters promises to challenge researchers developing models for interconnectivity, robustness, and sustainability.

In response to this, a UC San Diego-led team of computer scientists and optical interconnection systems technologists in the Center for Integrated Access Networks (CIAN) is developing Scalable Energy Efficient Data Centers, or SEED. SEED consists of novel optical interconnection technologies for a multi-stage network topology. The goal is to build SEED as an integrated solution encompassing physical layer hardware, protocols, and topologies — while offering tomorrow's data centers greater scalability, bandwidth, fault tolerance, and energy efficiency.

click to view awardee presentation

According to CIAN Deputy Director Shaya Fainman, who leads the SEED project at UCSD's California Institute for Telecommunications and Information Technology (Calit2), "This integrated solution would accommodate the growing size and performance required of future datacenters, while minimizing the cost and energy per switched bit."

outstanding individual contribution – Tom West

Recognized with the 2010 Outstanding Individual Contribution award is Tom West, former president of both CENIC and most recently, CEO of National LambdaRail, Inc. (NLR). West has over five decades of executive management experience in the research and higher education community. He has served as a small college president, a vice chancellor for administration for regional campuses in a public university system, and 26 years as the Chief Information Technology Officer (CITO) for two large public university systems—Indiana University (1973-1981) and the California State University (1981-1999).

From March 1999 through June 2004 he served as the President and Chief Executive Officer for CENIC. He served as CEO for both CENIC and NLR from September 2003 through June 2004, a time of great expansion for CENIC during which both the company and the communities it serves benefited tremendously from his extraordinary vision and ability to turn that vision into reality. He served as CEO of NLR until mid-October 2009 when he stepped down. Upon accepting his award, Tom took a few moments to recognize the larger community of dedicated technologists and researchers who have been essential partners in his many accomplishments, saying, "As my daughter likes to remind me, it really does take a village."

educational applications – eTranscript California

click to view awardee presentation

One of the most significant advantages to a dedicated, owned advanced network designed specifically for research & education is the freedom it affords the community to develop complex applications secure in the knowledge that the infrastructure will support them. One such application is eTranscript California, which provides secure, streamlined electronic transcript exchange for 53 post-secondary institutions in the State (community colleges, California State University campuses, and many private and independent colleges).

With a statewide transcript system in place, many other things are made possible, such as facilitating the exchange of a large number of transcripts using national standard data formats and allowing transcripts to be grouped into a single Composite Transcript which could be used for degree audit purposes or advanced student planning from a single input source.

In addition, this brings together high schools and postsecondary transcripts to be used for longitudinal studies on student success. Also, the CA Community College Chancellor's Office estimates that the transcript-related costs for eTranscript California member colleges will drop from an average of seven dollars to less than fifty cents per transcript.

gigabit/broadband applications – Rachelle Chong

click to view awardee presentation

Closing the "digital divide" is a matter of great concern for California, where our rural population is larger than that of at least twenty entire states. The California Public Utilities Commission (CPUC) allocated $100 million over two years to the CASF. The CASF provides incentives to companies to bring broadband service to unserved and underserved areas of California, many of which are rural, remote, or socio-economically disadvantaged communities. As a CPUC Commissioner, and the commissioner assigned to the CASF proceeding, Rachelle Chong was instrumental in the creation of the CASF and defining workable processes for implementation.

Thanks to her leadership, current Special Counsel of Advanced Information and Communications Technologies for the Office of the State Chief Information Officer Chong has brought California closer to its ultimate goal of ubiquitous broadband services for unserved and underserved communities. "Without a broadband pipe to provide access to the Internet, these unserved communities will become `digital have-nots'," said Chong. "Policymakers and corporate leaders across the nation have been talking about the importance of deploying broadband infrastructure for years, yet this critical infrastructure is not available throughout the state. It is time to stop talking and finish the job."

full speed ahead at the naval postgraduate school

On March 8, conference attendees were treated to a change of venue from the Regency Grand Ballroom at the Hyatt Monterey to the campus of CENIC Associate the Naval Postgraduate School. What followed was an afternoon of top-flight presentations by cutting-edge researchers, a demo that put CENIC's advanced networking into NPS through its paces and succeeded so well that the audience burst into spontaneous applause, and a reception in the beautiful and historic Hermann Hall.

Upon arriving at NPS, conference attendees were welcomed into the Mechanical Engineering Auditorium with a Plenary Address by Vice President and Dean of Research in Physics Karl van Bibber. Dr. van Bibber's presentation made it quite clear that to scientists doing computation-heavy research at the level currently taking place at the NPS, advanced networks such as CalREN have enabled a transformation in the way that science is done, enabling computation itself to take its place beside theory and experiment as the triple pillars supporting modern research. Using examples ranging from deep space astronomy to molecular dynamics and the physics of fluid flow, Dr. van Bibber demonstrated that high-performance networks and the vast stores of data to which they permit access have allowed a new understanding of processes relating to these areas of research that would previously have been unthinkable.

Following the Plenary Address was a presentation by Paul Sanchez on Data Farming, a further evolution of the accepted concept of data mining, where large sums of data (unmanageable without advanced networks) can be actively "farmed" to create new understanding using a host of new and previously impossible techniques. When studying effects that rely not on one or two or even twenty or a hundred variables, such techniques mean the difference between mystery and understanding.

The rendering of three-dimensional digital information has long been one of the "killer apps" for advanced networks, and Jeff Weekley and Jeff Haferman's presentation on the NPS's Hamming Supercomputer showed precisely how they've achieved their own rendering for researchers currently looking for scalable, affordable solutions to their own rendering-related challenges.

Geospatial data followed, a current hot topic the boundaries of which are still being determined, with a presentation by Don Brutzman and Dale Tourtelotte wherein they also demonstrated a scalable, affordable way to leverage enormous amounts of geodata. Both presentations concentrated on stable commercial tools that "played well with others" and would remain accessible to the researchers using them.

live HD video from Japan
Click to Watch

nps plenary address
Click to Watch

In the final presentation, Jeff Weekley took the podium again with Pacific Interface's Laurin Herr to discuss extremely high-definition video and the ways in which it can be used to display and better understand underwater habitats. Joining them remotely was Dr. Atsushi Takahara from NTT Labs in Japan, as a demonstration of the power and presence of live high-definition video. Viewers in the auditorium thousands of miles away in Monterey burst into spontaneous applause at the appearance of Dr. Takahara, literally larger than life and so clear as to appear almost more real than the live presenters. It was a stunning display of the robustness of the optical networks, including CalREN, which provided the connection between the two sites, and the way in which such performance is assumed to be standard in any high-bandwidth research application.

The reception that followed in Hermann Hall was accompanied by a poster session of research being done in the Monterey area at California State University, Monterey Bay, the Defense Language Institute, the Monterey Bay Aquarium Research Institute (MBARI), the Monterey Institute of International Studies, the NPS, and UC Santa Cruz. Hosted by Titanium Sponsors Cisco Systems and Brocade, the reception also gave Vice Provost Leonard Ferrari the opportunity to present CENIC President & CEO Jim Dolgonas with a "portrait" of the NPS campus as a thank-you for CENIC support of the School.

As with the conference presentations that took place at the Hyatt Monterey, the NPS segment of the conference program was also webcast live and archived for later viewing.