

THE QUILT CIRCLE

National Regional Networks Consortium
2011 Edition

...Advanced regional networking in support of research and education





Data Steward Be a reliable source of information for the R&E networking community

Advocate for regional and state research and education networks

Be the Convener for member and community forums

Quilt Goals

Build an Agile Organization to support our members in a fast changing networking landscape

Foster a collaborative environment

About The Quilt

Founded in 2000, The Quilt is a not-for-profit collaboration of our country's advanced regional networks. It is a vibrant forum where leaders of these organizations meet with their peers to innovate, share best practices and explore new ideas with one another to collectively advance networking for research and education in the U.S. Based on its members' combined experiences in operations and development of leading edge technologies, The Quilt aims to influence the national agenda on information technology infrastructure with particular emphasis on networking. Through its collaborations, The Quilt promotes the delivery of networking services at a lower cost, higher performance, greater reliability and security. The Quilt is a member-powered organization. It derives its funding and organizational support from contributions and volunteer efforts of its members.

A Letter from the President

The last year proved to be a very distinctive year for our country's advanced regional research and education networks with the release of federal funds through the National Telecommunications and Information Agency's Broadband Technologies Opportunity Program and the National Science Foundation's Advanced Research Infrastructure Program. Both of these programs aim to expand broadband opportunities for our country's community anchor institutions as well as further the advanced research infrastructure for our country's higher education institutions. These areas are the cornerstones of the work Quilt member organizations have performed for decades in support of providing advanced networking capabilities to their members.

As recipients and sub recipients of BTOP grants, seven Quilt members collectively received \$483 million in grant dollars, not including matching funds, for broadband projects. In addition, eleven of our members are actively involved in the planning and deployment of the BTOP initiatives in their state or region. Three of our members received NSF ARI awards to deploy leading edge 100Gbps networks.

These funds provided many of our members with an unprecedented opportunity to increase capacity to existing members and to extend their networks into rural areas of their states that were otherwise too cost-prohibitive to reach. As a result of these projects, extraordinary partnerships have developed between our members and private companies, many of which are local telecommunications providers. These partnerships not only create the opportunity to connect thousands of additional community anchor institutions to our member networks but also for partner telecommunications providers to share this infrastructure to provide broadband services to residences and businesses that was not previously possible.

In support of our members in this area, The Quilt found itself quite focused on three of its Guiding Principles in the last year:

- fostering a collaborative environment
- advocating for regional and state research and education networks and
- acting as a data steward for collecting information about our member organizations

The Quilt established a member and community forum to share information about the BTOP program. In this forum, members exchange ideas and provide information on their own efforts to deploy these grant funded projects. Through these efforts, The Quilt saw its members at their best. The support and cooperative spirit among the consortium was immeasurable and our work together this year was a valuable reminder of the stake we all share in the success of one another's organizations.

This edition of the Quilt Circle is filled with stories about our members in action in their communities, supporting advanced research, education, healthcare, and economic development through their advanced, high-capacity networks. These stories highlight our members' participation in the NTIA and NSF programs and feature the on-going work of our members to fulfill their public service missions. All serve as wonderful examples of the dedication and high level of support these organizations provide for their members. We are grateful to all for sharing their stories with us.

As The Quilt embarks on its second decade of working with our members, we look forward to our continued collaboration on topics of key importance to our country's advanced regional and state research and education networks.



Jen Leasure
President and CEO



The Quilt: A national community of innovators with a 10-year track record of successfully working to:
Collaborate—Advocate—Leverage

COLLABORATE

Member organizations collaborate to collectively advance research & education networking.

We collaborate by:

- » Developing and exchanging best practices
- » Solving problems together
- » Sharing information
- » Developing the newest advancements in networking

Examples

- » Hosting community workshops, e.g., optical networking workshop series
- » Providing a collection of member business model cases
- » Convening the Tele-Presence working group

ADVOCATE

The Quilt serves a single point of contact to engage partners on behalf of our members and their work.

Examples

- » Federal Policies such as the FCC's national broadband plan
- » Federal funding sources such as the National Science Foundation and Broadband Technology Opportunities Program (BTOP)
- » Industry Partners such as optical equipment providers

LEVERAGE

Members leverage the collective consortia knowledge and buying power, contributing to the value each member provides to their participants.

Knowledge Broker

- » Support organizational review projects by peers
- » Source of aggregate data about our country's R&E networks

Buying Consortia

- » Commodity internet services (CIS)
- » Network Equipment
- » Since 2002, members have saved a total of \$68,000,000 on CIS

The Quilt gathers our country's leading research and education networking organizations to promote consistent, reliable, interoperable and efficient advanced networking services that extend to the broadest possible community; and to represent common interests in the development and delivery of advanced network services. Participants in The Quilt provide network services and applications to more than 200 universities and thousands of other educational institutions.

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THE QUILT



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Ocean Observatories Will Make Use of CENIC and PNWGP 10-Gigabit Peerings with Amazon Web Services

In an effort to control cost while expanding services for their members, Corporation for Education Network Initiatives in California (CENIC) and Pacific NorthWest GigaPoP (PNWGP) are collaborating to provide two 10 Gigabit per second (Gbps) connections to the Amazon Web Services: Amazon Simple Storage Service (Amazon S3) and Amazon Elastic Compute Cloud (Amazon EC2). S3 provides a web services interface that can be used to store and retrieve any amount of data, at any time, from anywhere on the web and gives developers access to the same scalable, reliable, fast and inexpensive data storage infrastructure that Amazon uses to run its own global network of web sites. EC2 features a web service interface that allows researchers to obtain and configure the massive compute resources that innovative research requires.



Among the first users to benefit from access to Amazon Web Services will be researchers participating in the \$400 million National Science Foundation-funded Ocean Observatories Initiative (OOI) Cyberinfrastructure (CI) project. The University of California, San Diego (UCSD) is building the information technology and telecommunications infrastructure that will bring ocean and atmospheric sensor data from the observatories and make them available to environmental researchers around the country and throughout the world. Research teams in California will have the option to do their storage and computing on their own machines or remotely on Amazon S3 or Amazon EC2.

Early on, OOI CI researchers recognized that given the scale of the initiative, it would be too expensive and unwieldy to manage all storage and computation via the traditional model of building large, dedicated data centers. “We always envisioned cloud computing as a key component of our implementation strategy,” said John Orcutt, OOI CI Principal Investigator and a professor of geophysics at UCSD’s Scripps Institution of Oceanography. “At our core, we are a sensor network, and, with streaming data from sensors, we need both continual and periodic computation,

including elasticity to deal with a highly variable demand. So we focused on core measurement processing as well as distribution and presentation of the data. This led to a shared model where some work could be managed by academic computing and other work by commercial clouds.”

The OOI will monitor and forecast environmental changes in the oceans on global, regional and coastal scales. Scientists will be able to extrapolate from data gathered by an array of more than 50 diverse sensor types and other scientific instruments that will communicate through permanently installed seafloor cables and satellite telemetry. Scientists will then be able to share data with their colleagues around the world via OOI’s networked cyberinfrastructure, which is being implemented by a team of computer scientists, engineers and geophysicists.

In the long run, hundreds or thousands of researchers will benefit from the new high-bandwidth connections between California Research and Education Network (CalREN) and PNWGP’s networks and Amazon Web Services. “We anticipate that many OOI users will need Amazon’s cloud,” said OOI CI’s Matthew Arrott.

About CENIC: California’s education and research communities leverage their networking resources under CENIC, the Corporation for Education Network Initiatives in California, in order to obtain cost-effective, high-bandwidth networking to support their missions and answer the needs of their faculty, staff, and students. CENIC designs, implements, and operates CalREN, the California Research and Education Network, a high-bandwidth, high-capacity Internet network specially designed to meet the unique requirements of these communities, and to which the vast majority of the state’s K-20 educational institutions are connected. In order to facilitate collaboration in education and research, CENIC also provides connectivity to non-California institutions and industry research organizations with which CENIC’s Associate researchers and educators are engaged. For more information see www.cenic.org

About PNWGP: PNWGP is a not-for-profit, advanced networking organization whose roots go back to the creation of the original Internet. PNWGP provides state-of-the-art broadband, optical, and other networking as well as direct peering and exchange capabilities. These offerings serve to interconnect nearly all of the major research institutions and many other schools and colleges in Washington, Alaska, Hawaii, Montana and Idaho to one another and all of the USA national research and education networks. Further international connectivity is facilitated via the Pacific Wave distributed international peering facility which PNWGP operates with CENIC, and in which most of the research and education networks in countries around the Pacific Rim participate. For more information see www.pnw-gigapop.net



Prairie Light: Next Generation Optical Networking for Mid Continent Science

The National Science Foundation (NSF) has awarded three universities in Kansas \$1.176 million over two years to upgrade KanREN, the research and education network in Kansas. The University of Kansas (KU), Kansas State (KSU) and Wichita State University (WSU) will collaborate on a project that will directly benefit research by increasing available bandwidth and increasing reliability of the network.

Researchers in Kansas have depended on the network since its inception to enable and enhance their research. The upgrade will further enhance and enable research within Kansas and beyond its borders by allowing exchange and analysis of large data sets and increasing the ability for researchers to collaborate.



Photo Courtesy of Rick Summerhill

“The NSF EPSCoR-funded ‘Prairie Light’ 10 Gbps upgrade to KanREN is a foundational piece for a Kansas Science Commons on which researchers at institutions of higher education can build stronger research collaborations through broader sharing of sophisticated instruments and computing resources. Students will learn in an environment rich with tools and expertise,” said Donald F. “Rick” McMullen, director and senior scientist for research computing at KU. “This next-generation research network will enable activities that maximize national and state investments in computing infrastructure at individual campuses by making them easier to share and to build into distributed research collaborations.”

Specific research projects that will benefit from the upgrade include:

- Ecological Forecasting in the Great Plains, a collaboration between the University of Kansas and Kansas State University
- The cyberCommons for Ecological Research, a NSF-funded collaborative project between KU, KSU, the University of Oklahoma, and Oklahoma State University;
- Climate Change and Energy: Basic Science, Impacts, and Mitigation, the newly funded initiative that consists of a collaboration among four Kansas universities— KU, KSU, WSU, and Haskell Indian Nations University—the economic growth organization Kansas Technology Enterprise Corporation and several private sector companies
- Fundamental network research through an NSF GENI collaboration between two universities in Kansas and other member institutions in the Great Plains Network.

About KanREN: Kansas Research and Education Network (KanREN, Inc.) is a non-profit consortium of colleges, universities, school districts and other organizations in Kansas, organized for the purpose of facilitating communication among them and providing themselves with connectivity to the Internet via a statewide TCP/IP network.

QUILT FACT

40% of Quilt members are organized as 501(c)(3).



MOREnet's Desktop Video Pilot Spurs Innovation in Missouri

The Missouri Research and Education Network (MOREnet) is helping schools and other organizations communicate around the world. In 2010, MOREnet launched a pilot program using Desktop Video Services. Much like traditional video rooms, the end user can communicate two-ways, both with the videoconference room and other desktop end users. Using the Polycom Converged Management Application (CMA), which is designed for its compatibility to H.323 videoconferencing, the desktop end-user only needs to download an application and use a webcam.

By itself, the technology is exciting, but the pilot demonstrated to MOREnet some of the innovative and useful ways its members used this new application. Eight MOREnet members were part of the pilot program utilizing more than 50 endpoint licenses. A user in a state agency office used the video desktop service to provide live video hearings to commissioners in a public hearing setting, allowing the commissioners to participate in the hearings without leaving their offices. One commissioner even attended the public hearings using CMA from China.

A Missouri K-12 member used the software, a laptop and a webcam so a high school student could attend his classes after a debilitating car accident. Another K-12 member is using the software to record high school courses so any absent student can log in from home and watch what he or she missed in school.

Gone are the days when expensive equipment and video rooms are needed to maintain a course online. With a camera and the help of MOREnet's Network and Video Services, videoconferencing and video courses are accessible to almost anyone. MOREnet plans to launch this new service to its members in Fiscal Year 2012.



Today, MOREnet has evolved from focusing on Internet service delivery to a consortium-driven organization deploying and supporting the technology resources members need to be successful. MOREnet provides such essential services as technical support, videoconferencing support, technical training and network security. From advanced communication tools and online resource databases to network configuration and assessment, MOREnet is committed to supporting and enabling its members' missions through the use of technology to enhance opportunities for public access, learning and research.

About MOREnet: MOREnet is a consortium of schools, public libraries and higher education institutions, originally formed through collaboration between the Department of Elementary and Secondary Education, the Secretary of State's Office and the Department of Higher Education. MOREnet, which operates as a separate business unit within the University of Missouri, was created in 1991 to deliver secure, reliable and robust Internet connectivity to its member organizations. For more information see www.more.net.

QUILT FACT

The Quilt member representatives are invaluable resources to the communities they serve and to one another. As one of its member services, The Quilt's offers a Peer Review Service which draws upon its members' expertise to facilitate reviews upon the request of our member organizations and their boards. These peer review efforts provide Quilt members with important benchmarking information and recommendations for specific areas of their operations. MOREnet recently utilized The Quilt's Peer Review Service to receive input from a panel of Quilt members sharing their expertise and recommendations on potential changes to the MOREnet organization and its membership structure.

The Front Range GigaPoP: A Valued Partner in Advanced Networking

For over 12 years, the Front Range GigaPoP (FRGP) has advanced the research and educational goals of government, nonprofit, and educational members and other institutions in the Rocky Mountain region by establishing and maintaining a unique multi-state network infrastructure that is owned and controlled by the FRGP member research and education community. The FRGP is a key collaborator at the state, regional, and national levels providing advanced networking for its members. Current collaborations that highlight the important work and contributions of the FRGP to advanced networking include:

1. The Western Regional Network (WRN) - The Front Range GigaPoP, along with the Pacific Northwest GigaPoP, New Mexico/University of New Mexico, and the Corporation for Education Network Initiatives in California announced the formation of the Western Regional Network. WRN is a multi-state partnership providing robust, high-speed networking for research, education, and related uses through the sharing of network services among communities across the western U.S. WRN provides cost savings by providing intra-region peering, efficient and cost-effective commodity Internet services, TR/CPS connections, and shared NLR and Internet2 services in addition to diverse backup connectivity options.
2. UCAR Point of Presence (UPoP) - The UPoP is a consortium of institutions hosted by the University Corporation for Atmospheric Research, that shares wide area network services, intra-FRGP traffic, commodity Internet, and Internet2 access. The UPoP has substantially contributed to the growth of the FRGP as one of its largest single users. In the last 4 years, UPoP has added 13 members. This dynamic growth is expected to continue in 2011 as one of the newest UPoP members will be the Colorado Telehealth Network, which will connect hundreds of health care related sites throughout Colorado as a result of an FCC Rural Health Care Pilot Program award. More growth is also expected to come from the Educational Access Gateway Learning Environment Network a public-private partnership that brings broadband service to school districts, libraries, and community anchor institutions across Colorado. Colorado's Centennial Board of Cooperative Educational Services, as the sponsoring entity of EAGLE-Net, received a \$100 million Round 2 BTOP grant.
3. Bi-State Optical Network (BiSON) - With stimulus funds from the National Science Foundation's Advanced Research Infrastructure program, the BiSON recently completed an upgrade to support 10Gbps, 40Gbps, and 100Gbps capabilities on a resilient fiber ring spanning sites in Colorado and Wyoming. The BiSON partners are the National Center for Atmospheric Research, the University of Wyoming, Colorado State University, the National Oceanic and Atmospheric Administration - Boulder, and the University of Colorado Boulder. The upgraded BiSON ring will include connections to the NCAR Wyoming Supercomputing Center (NWSC) currently



being constructed outside Cheyenne, Wyoming. NWSC will house one of the world's fastest supercomputers for scientific research and will provide advanced computing services to scientists across the nation in a broad range of disciplines, including weather, climate, oceanography, air pollution, space weather, computational science, energy production, and carbon sequestration. It will also house a premier data storage and archival facility that will hold, among other scientific data, unique historical climate records.

About FRGP: The FRGP is a consortium of Universities, nonprofit corporations, government agencies, and secondary members behind primary FRGP members who cooperate as part of a Regional Optical Network (RON) in order to share wide area networking services including the commodity Internet, Internet2, National Lambda Rail (NLR), and peering connectivity.

Relevant links:

<http://www.frgp.net/>
Front Range GigaPoP

<http://westernregional.net>
Western Regional Network

<http://upop.ucar.edu>
UCAR Point of Presence

<http://www.cotelehealth.com/>
Colorado Telehealth Network

<http://www.co-eaglenet.net/>
EAGLE-Net

<http://nwsc.ucar.edu>
NCAR Wyoming Supercomputing Center



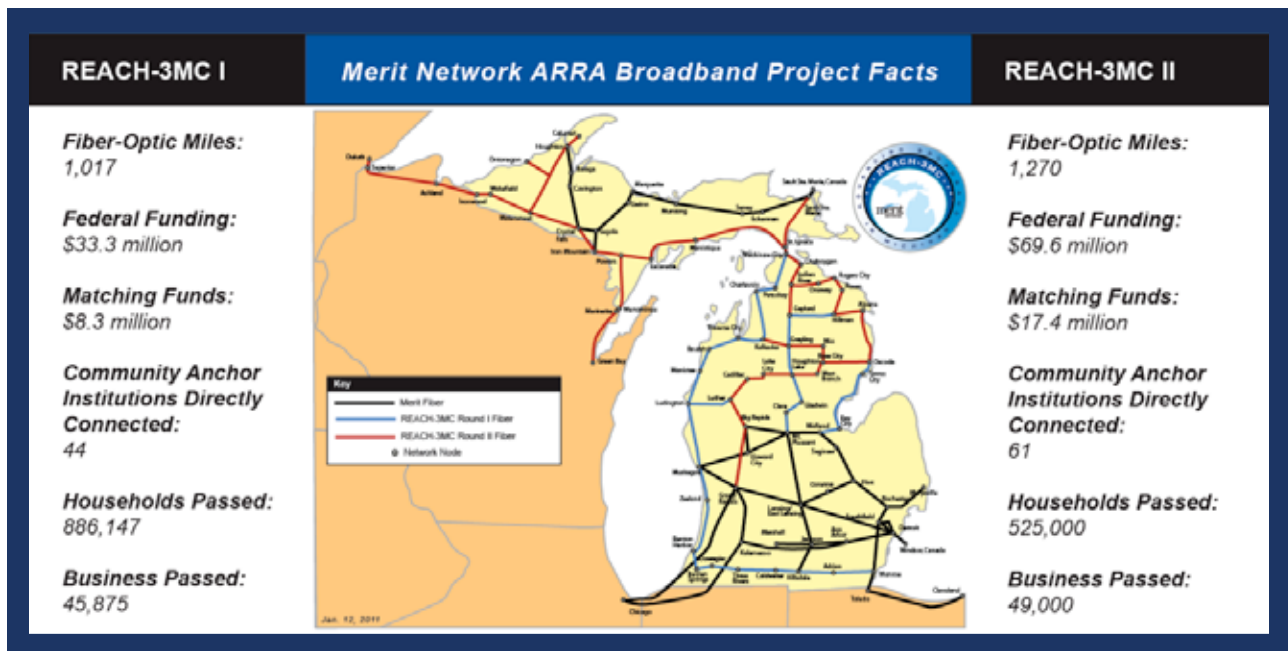
Merit Network – Building 2,287 Mile-Long Fiber-Optic Network Extension in Michigan with Key Interconnection Points in Wisconsin and Minnesota

In 2010, Merit Network, Inc. was granted two federal stimulus awards to build a fiber-optic network extension in Michigan that will also provide the region with critical backhaul to connection points in Wisconsin and Minnesota. The Rural, Education, Anchor, Community and Healthcare – Michigan Middle Mile Collaborative (REACH-3MC) is a collaboration between Merit and commercial sub-recipients that will create much-needed, middle-mile infrastructure in many parts of the state. REACH-3MC is funded through the Broadband Technology Opportunities Program (BTOP) of the National Telecommunications and Information Administration (NTIA).

Merit's portion of REACH-3MC fiber will allow state and local governments, universities, schools, libraries, healthcare facilities and other community anchor institutions to connect to Merit's private, high-performance network, enabling them to lower costs, consolidate services and provide more to Michigan's citizens. Merit's existing fiber infrastructure combined with the new REACH-3MC network infrastructure creates a robust foot-print in the state, providing Michigan with a strategic asset to leverage in the future. Merit members will soon have the opportunity to take advantage of Merit's statewide fiber infrastructure.

The REACH-3MC network includes fiber across the Mackinac Bridge and the Upper Peninsula. Diverse paths, providing much-needed redundancy to the region, will terminate at the University of Minnesota Duluth and University of Wisconsin - Green Bay. This will connect Merit's network with the networks of neighboring BOREAS-Net, Northern Tier Network and WiscNet. Leveraging these connections, REACH-3MC will provide direct fiber-optic connections between research and education networks from Alaska to Ohio.

About Merit: Merit Network, Inc., a nonprofit corporation owned and governed by Michigan's public universities, owns and operates America's longest-running regional research and education network. In 1966, Michigan's public universities created Merit as a shared resource to help meet their common need for networking assistance. Since its formation, Merit Network has remained on the forefront of research and education networking expertise and services. Merit provides high-performance networking solutions to Michigan's public universities, colleges, K-12 organizations, libraries, state government, healthcare, and other non-profit organizations.



LEARN's National Weather Service Partnership

The National Weather Service (NWS) and Lonestar Education and Research Network (LEARN) recognize the critical importance of collaboration with public, private and academic partners to achieve our mutual public service mission. Nearly 5,000 NWS scientists, forecasters, technicians and support personnel work closely with the emergency management community, media and other partners to prepare for and mitigate the impacts of natural or man-made events. Weather prediction and warnings help protect our nation's infrastructure, and climate forecasting contributes to the management of the nation's water resources, energy supply and food security.

During the next decade, weather, water, climate and environmental information will play a greater role in the decisions we make as individuals and as a society. The information will affect significant decisions, including the quantity and quality of water we need, the quality of the air we breathe, generation and distribution of renewable energy and safe passage on our country's highways, railways, over the sea and in the air. It is all designed to make our lives safer, healthier and more productive.

The NWS has responded to changes in the way people communicate and share information by using new technologies to make weather information more accessible and interactive. The LEARN network plays an essential role in the dissemination, communication and validation of critical NWS forecasts and warnings to the public. The partnership between NWS and LEARN provides critical, reliable and trusted weather, water and climate information to foster a safe, healthy and weather-wise society.

About LEARN: The Lonestar Education And Research Network (LEARN) is a consortium of 36 organizations throughout Texas that includes public and private institutions of higher education, community colleges, the National Weather Service, and K-12 public schools. The consortium, organized as a 501(c)(3), connects these organizations, and over 500 affiliated organizations, together with high performance optical network services to support their research, education, healthcare and public service missions. LEARN is also a part of a national community of research optical networks, and provides Texas connectivity to the national and international research and education networks.



New Network Supports NOAA's Data and Computing Advances

From daily weather forecasts, severe storm warnings and climate monitoring to fisheries management, coastal restoration and supporting marine commerce, NOAA's dedicated scientists use cutting-edge research and high-tech instrumentation to provide citizens, planners, emergency managers and other decision makers with reliable information when they need it.

To get better weather forecasts and climate predictions, better models are needed. Better forecasting models depend on tremendously large data sets and the computing power to analyze the data. National Oceanic and Atmospheric Administration (NOAA) is spotlighting a third crucial element—a powerful secure network that connects the modeling researchers with their data and supercomputing centers. To do that, NOAA is building N-Wave, its nationwide, high-capacity data transfer network.

Now 10 years in the making, NOAA's N-Wave is a stable and secure network that can send the information contained in two hours of YouTube video in a single second. N-Wave enables the agency's world-class weather and climate modeling research and development. N-Wave will vastly improve information exchange among large NOAA research and operational sites, helping the agency meet its mission to better understand and predict changes in Earth's environment and conserve and manage the nation's coastal and marine resources.

When the High-Performance Computing Program at NOAA determined the need for a consolidated agency-wide network resource to meet its advanced research connectivity requirements and supplement operational connectivity requirements, who could it rely on to build such a network? The answer was a very straightforward one: NOAA would utilize the network facilities provided by our country's regional and national research and education networks.

N-Wave's creation and success is dependent on “the partnerships and long-term relationships among NOAA and the research and education network communities,” said Jerry Janssen, project director. Highly scalable and cost-effective, the network can expand as needed, using fiber-optic links supplied by partners in the national science network community including several Quilt members , Internet2, the Global Research Operations Center (GRNOC) and the National Lambda Rail.

¹ Mid-Atlantic Crossroads (MAX); Front Range GigaPoP (FRGP); North Carolina Research and Education Network (NCREN) managed by Microelectronics Center of North Carolina MCNC; Pacific Northwest GigaPoP (PNWGP); Florida Lambda Rail, LLC (FLR); Oklahoma's telecommunications and information network OneNet; and the Lonestar Education And Research Network (LEARN).



MCNC is Connecting North Carolina's Future Today

Microelectronics Center of North Carolina (MCNC) currently is working on a \$146 million expansion of the North Carolina Research and Education Network (NCREN) expected to be complete by 2013. This initiative has been labeled the Golden LEAF Rural Broadband Initiative.

To fund this expansion, MCNC applied for and received two U.S. Department of Commerce Broadband Technology Opportunities Program (BTOP) awards totaling \$104 million. In addition, MCNC raised \$42 million in private matching funds as required by the BTOP program. MCNC's sources of matching funds included \$24 million from the Golden LEAF Foundation, \$8 million from the MCNC Endowment, \$4 million from private-sector wholesale telecommunications company FRC, and an estimated \$6.55 million through donations of land and existing conduit from individual community colleges, universities, and others including the Albemarle Pamlico Economic Development Corporation. No direct funding from the State of North Carolina was required. MCNC estimates the expansion of NCREN will create or save 2,500 engineering, construction, and manufacturing jobs in the state.

Both MCNC awards are a part of a coordinated strategy developed by the Office of the Governor, the N.C. Office of Economic Recovery & Investment and e-NC Authority to improve broadband access for businesses and residents in underserved areas. Once all work is complete, the expanded infrastructure has the potential to serve directly, or through MCNC partnerships with private-sector service providers, more than 1,500 community anchor institutions, 180,000 businesses, and reach more than 300,000 underserved families.

As a part of the sustainable business plans for MCNC's two BTOP awards, MCNC collaborated with North Carolina Information Technology Services (ITS) to provide rural broadband connectivity and services to create the North Carolina Telehealth Network (NCTN). The customer partners within the NCTN combined four FCC Rural Health Care Pilot Program awards into two phases that provide discounted broadband services in the first phase to public health offices and free clinics, and to non-profit hospitals in the second phase. Program awards total \$12.1 million. The NCTN will be focused on the emerging needs of North Carolina and will connect health care facilities with high-speed bandwidth to support leading-edge health care throughout the state, especially in rural areas. These services provide the size, reliability, and security needed for daily health data sharing in addition to supporting disaster preparation and recovery activities.

About MCNC: Founded more than 25 years ago, NCREN was one of the nation's first statewide education and research networks. NCREN currently has 338 connections in North Carolina servicing 2,500,000 users in public education (1,450,000 in K-12; 850,000 in Community Colleges; and 200,000 at universities). NCREN also serves the broadband needs of many health care community anchor institutions in the state. The demand for bandwidth among health care and education institutions grows annually between 20 and 40 percent. And, the applications these institutions operate require a level and type of connectivity not commercially available to optimally perform. For more information on MCNC and its BTOP projects visit www.mcnc.org/btop.



QUILT FACT

64% of our members are involved in BTOP initiatives



NYSERNet: Building Community to Industry and Government with Strong Collaborative Links

Today's global challenges such as energy, climate change, health care, financial modeling and technology are issues subsuming disciplines, institutions, sectors, and nations that increasingly compel our collective response. Research on these issues requires very different computing and networking resources from the early days of research and discipline specific applications. Today's global challenges and research require the ability for cross-disciplinary, cross-global teams to move large amounts of data to many locations to share among many individuals.

In New York, NYSERNet is a key initiator and stakeholder in fostering collaboration among a community of stakeholders in research efforts within the state. New York's research enterprise includes first-rank public and private higher education institutions, hospitals in the vanguard of medical advances, IBM, GE, Corning and Kodak's research headquarters, and many other major corporations with a significant research presence in New York (e.g., Northrop Grumman, Lockheed Martin, Xerox, Welch Allen) as well as a myriad of smaller companies, a significant number of these in university incubators. Though individual researchers at universities and hospitals have long had industry partners, the NYSERNet Board of Directors made a commitment early on to actively outreach as a community to industry and government and to explore the possibility of forging stronger collaborative links. Combined with the commitment of the heads of IBM research and by NYSTAR, New York's funding agency for science and technology, the state of New York is making valuable progress. Researchers and research administrators from academe, industry and government have convened twice to date to address obstacles to successful collaboration.

These concentrated meetings yielded clear near term objectives. The need for "bridging" people in order to connect experts in high performance computing or other advanced technology with specific disciplinary training was universally acknowledged as was the need to identify and support researchers whom high performance computing would benefit. Another significant result was the awarding of a grant to create a network of such facilitators by NYSTAR to Rensselaer, Buffalo, Brookhaven/Stony Brook, and NYSERNet. The need for continued investment in advanced, shared tools to address grand challenge problems was also recognized, a priority that, despite budgetary challenges, people within Governor Cuomo's administration at the highest levels have now reaffirmed.

This collaboration has improved our mutual understanding of the coupling of computers to process research data and an advanced network with unique capabilities to handle the massive data flows. As part of this research cyber infrastructure, NYSERNet plays a crucial role in continuing to provide a research network that equals the rapidly growing data flow demand, to sustain its global peering point in Manhattan, to contribute to international discussion regarding such facilities' nature and function, to understand the academic and corporate research community's needs, and to ready the network resources required.

About NYSERNET: NYSERNet is a private not-for-profit corporation created to foster science and education in New York State. Its mission is to advance network technology and related applications to satisfy needs common to the institutions comprising New York State's research and education community, providing a forum for exploration of the opportunities and challenges these innovations present. More information on NYSERNet can be found at www.nysernet.org.



Relevant links:

<http://www.nysernet.org/pub/nyas>

first 'Shaping a Cyber Infrastructure for New York' conference

<http://www.rpi.edu/highperformancecompconf>

second 'Shaping a Cyber Infrastructure for New York' conference

QUILT FACT

100% of our members serve public universities and colleges



Ocean State Libraries and OSHEAN Awarded \$1.2M Federal Stimulus Grant to Fund 600 New Library Computers and Mobile Computer Centers

In February 2010, Ocean State Libraries (OSL), in partnership with OSHEAN, was the sub-recipient of a Federal Broadband stimulus grant awarded by the National Telecommunications and Information Administration (NTIA). The \$1.245 million grant will provide over 600 computers and printers for public service and public access. One hundred new laptops, equipped with Internet connections will be used to establish twelve mobile computing labs that will be housed and shared at various library locations. In addition, the grant will provide central libraries and their branches with new state-of-the-art routers and switches, ensuring that each site will have upgraded bandwidth capabilities.

The grant, awarded as part of the Federal Broadband Technology Opportunities Program (BTOP) will expand the libraries' capacities to offer public-use of personal computers, enable expanded employment training and workshops, and provide streaming, video conferencing and an archiving ability that will allow libraries to offer classes in one location while sharing content at another. "Being able to simulcast our programming from one library to others and to archive sessions so they can be reviewed later or seen by someone who cannot attend the scheduled classes brings great economies of scale to the efforts in our libraries and brings broader access to our citizens," said Lisa Davis, OSL Assistant Director.

It has been estimated that over 36,000 library patrons will utilize the newly upgraded computers each week. Bi-lingual trainers will enable libraries to provide workshop training opportunities to a large part of the community; more so than ever before. Before the grant award, library branches used public computers for class training sessions. This limited and often interfered with the allotted amount of time available for community members to use the computers. Now, with the new mobile labs, branches can hold classes when and where they want without disturbing a patron's computer time.

"Receiving the BTOP stimulus grant represents an unprecedented opportunity for the citizens of Rhode Island," said Joan E. Gillespie, OSL Executive Director. "We are also very grateful to the state Office of Library and Information Services for their help and to the Champlin Foundations for providing matching funds for this grant and for their ongoing support of RI libraries. They have truly built the backbone of library technology in Rhode Island."

In times of library funding cuts, these grant awards will strengthen the libraries' abilities to serve the citizens of Rhode Island better than ever.

About OSHEAN: OSHEAN Inc., (pronounced ocean) is a consortium of non-profit organizations that was formed to foster the development of a communications infrastructure for Rhode Island's research, educational, health care, and public service community. OSHEAN is committed to developing network expertise among its member organizations and to creating an environment that encourages collaboration through shared resources, information and expertise.



QUILT FACT

74% of the membership serve public libraries



UEN's Broadband Infrastructure Serves Students and Educators and Saves Millions of Taxpayer Dollars

Utah Education Network (UEN) is actually two networks. One—a robust broadband data network—connects Utah schools and districts, charter schools, colleges, universities and public libraries. The other—a diverse network of educators, leaders, engineers, accountants, programmers and communicators—drives the thinking and research that the broadband network enables.

Both networks work together to serve Utah teachers and students, saving Utah taxpayers millions of dollars annually. Both networks embody UEN's mission statement, "We network to create educational opportunities, connect people and collaborate with partners in serving Utah Communities."

For example, the UEN statewide Learning Management System (LMS) will transition from Blackboard Vista to Instructure's Canvas LMS over the next two years. UEN's success with Blackboard wins praise from Chuck Wight, Dean of the University of Utah Graduate School. "The central hosting model has worked very well for us, because UEN is able to devote a small but extremely capable team of system administrators to the task."

"The LMS selection committee's decision is a win-win-win for the state of Utah," says UEN's CEO and executive director Mike Petersen. "It's a win for Utah students and faculty who gain a state-of-the-art Learning Management System at a competitive price. It's a win for Utah-based Instructure, who created an excellent product, and it's a win for all Utah citizens who benefit from the economic development made possible by a well-educated cadre of college students. The Canvas contract combined with the efficiencies of central hosting will save the state more than \$1.5 million annually. In a time of increasingly tight budgets, we deliver exceptional value for every dollar spent."

Another example of UEN's technical and human synergy is the Network's extensive Interactive Video Conferencing (IVC) system. From July through December 2010, UEN provided more than 23,000 events and meetings for public education, higher education and state government. More than 3,000 of those were concurrent enrollment events in which high school students take college level courses, earning high school and college credit simultaneously. Students pay less than \$100 to register for the program and save thousands in college tuition costs.

State agencies benefit from UEN bandwidth. The Utah Division of Rehabilitation Services has saved an estimated \$600,000 annually in per diem, lodging, mileage and increased productivity using its own teleconferencing equipment over UEN's infrastructure.

Since the network leases most of its circuits from commercial telecom providers like Qwest, CentraCom Interactive and South Central Communications, UEN earns Federal E-Rate discounts for services provided to public schools and libraries. The E-Rate program reimburses about \$7 for every \$10 the state spends on many circuit costs, generating substantial savings.



Utah State University (USU) would have paid more than \$12.6 million to lease circuits at telecom tariff billing rates. With UEN's statewide contracts and discounts, net circuit costs are about \$1.7 million. The Network saves Utah taxpayers about \$11 million annually for this institution alone.

Working side-by-side, UEN's broadband data network and its human network deliver mission critical services to educators and students ranging from preschoolers to seniors citizens. As Utah enters the second decade of the 21st century, UEN's motto to connect, create and collaborate is a reality for the taxpayers it serves.

About UEN: The Utah Education Network (UEN), based out of the University of Utah in Salt Lake City, provides high-speed connectivity to more than 200 rural classrooms and positively impacts the lives of more than 530,000 public education students throughout the state. In addition the network provides high-speed connectivity to all ten state-owned colleges and universities. That includes more than 220,000 higher education students. From kindergarteners through graduate students UEN provides mission critical connectivity to more than 750,000 Utah students. For more information on UEN, see www.uen.org.



Albuquerque GigaPoP Expands Network Services to Navajo Nation

Albuquerque GigaPoP (ABQG) has expanded network services to two Navajo Nation educational institutions in the state of New Mexico. Navajo Preparatory School, also known as Navajo Prep, and Navajo Technical College (NTC) have acquired telecommunication services and Internet access to advance education and research. Both schools serve a diverse population of American Indian students who travel from areas located in and around the Four Corners region of the state and from other American Indian tribal communities.

Both schools are now members of ABQG's List of Collaborators and have access to commodity internet. NTC and Navajo Prep are now equipped with reliable, efficient, and affordable technology to create new tools to deliver education, enhance curriculums, and extend networks to the un-served and underserved in their areas, continuing the mission of ABQG—to enhance education and research.

New Mexico remains a mostly rural state with major population centers in seven separate areas spread throughout the state. The ABQG vision includes support the Wire New Mexico initiative bringing Internet connectivity to all of New Mexico with the help of ABQG participants. State-wide networking reduces the amount of "hops" (routers determining traffic flow) around the nation on the Internet by keeping the network traffic in-state. By developing these types of collaborations, leveraging technological assets, reducing duplication and sharing large bandwidth access, ABQG is assisting in "unleashing new waves of innovation" to encourage network access to rural locations throughout the State of New Mexico.

About: Located in Farmington, New Mexico, a few miles outside the Navajo Nation, Navajo Prep is the only Navajo sanctioned, college preparatory school for American Indians. With a 90% success rate of students attending higher education, the school offers an advanced curriculum in science, math and technology, along with the traditional academic subjects. Based on the foundation of Navajo (Diné) philosophy and a strong appreciation of the Navajo language, culture, and history, Navajo Prep students are equipped with the skills and knowledge to become leaders of their people and role models for future generations.

Formerly known as Crownpoint Institute of Technology (CIT), Navajo Technical College (NTC) is a two-year tribal technical college located in a quiet rural area in Crownpoint, NM on the Navajo Nation. With campuses in Crownpoint, NM and Chinle, AZ, NTC offers a variety of courses, programs, and services to meet an individual's needs to earn a certificate or associate degree. Recently, NTC received approval from the Higher Learning Commission of the North Central Association (NLC-NCA) to provide two (2) four-year degree programs: Applied Science degree in Information Technology and Registered Nursing. These new bachelor degree programs will meet the demands for jobs involving the computer sciences, information technology, digital media and registered nursing.

About the Albuquerque GigaPoP: ABQG is a state-of-the-art interconnection facility established by the Information Technologies group at the University of New Mexico in collaboration with New Mexico Institute of Mining and Technology, New Mexico State University, New Mexico Council for Higher Education Computing Communication Services (CHECS) and the New Mexico State Agency of IT. It is designed to serve research and education programs in New Mexico. ABQG is the on-ramp for high speed National Networks. These high speed networks are the National Lambda Rail and Internet2. Additionally, access is available to commodity Internet and peering to keep in-state traffic local.



Photo Credit: American Indian Higher Education Consortium (AIHEC)



QUILT FACT

96% of Quilt members serve K-12



Ohio Library Repository Thrives in the Cloud

OARnet's cloud computing service consolidates system infrastructure; benefits extend worldwide

Ohio campuses are treasure troves of knowledge, but valuable resources are often hidden. With the Digital Resource Commons (DRC), scholars worldwide have a single access point to the research, historic and creative materials produced at Ohio's public and private colleges.

The multi-institution academic repository shifted into the cloud last year, thanks to the combined efforts of the Ohio Library and Information Network (OhioLINK), and OARnet, Ohio's research and education network.

The DRC is just one of many programs actively running on OARnet's private cloud computing service, created in 2010 to consolidate the system infrastructure for the Ohio Board of Regents and five of its shared services partners, including OhioLINK and OARnet. OARnet centralized the partners' processing and storage requirements, thereby creating a shared environment that meets their requirements while reducing costs for hardware, software and staff.

The American Library Association Office recently selected the DRC project as one of four winners of its America's Libraries for the 21st Century award, which honors cutting-edge technologies in library services.

The DRC model demonstrates that libraries and consortia can create cloud-computing environments that meet their needs and expand their services," said John Magill, executive director of OhioLINK.

Each member organization can design its DRC instance to match its main website with the flexibility to administer it remotely. The system uses DSpace open source software to store more than a 250,000 items from 17 institutions; it serves more than three million page views annually to visitors from 138 countries.

"The DRC's success highlights how consolidating systems and moving access to a virtual infrastructure not only saves expenses, but also improves flexibility, storage, development and staffing needs," said Pankaj Shah, executive director of OARnet. "Moreover, this savings is above and beyond the \$3.7 million the University System of Ohio saves or avoids with OARnet's cloud computing shared service."

About OARnet

The Ohio Academic Resources Network (OARnet) provides technology solutions for Ohio's education, public broadcasting, health care and government communities. For more than 20 years, OARnet has identified and deployed shared services that reduce costs, deliver quality programs, increase productivity and improve customer service. Our communities voluntarily participate in the OARnet consortium because they value these benefits and services. Ultimately, OARnet promotes community and economic development by expanding access to affordable technology.



QUILT FACT

*42% of the membership offer cloud services
and 58% offer data center services*



SCinet: The Fastest Computer Network in the World

For one week in November 2010, New Orleans was home to the fastest computer network in the world. The network, SCinet, is created each year for SC, the international conference for networking, storage, analysis and high performance computing. Over 100 individuals from the research and education community volunteered their time and expertise to provide a production 100 Gbps wide-area circuit and to build a wide-area network infrastructure capable of delivering 260 Gbps aggregate bandwidth to enable exhibitors to demonstrate some of the most advanced computing applications and services. If this network were available to the general public, a user could download the entire Library of Congress' collection of books in about 30 seconds.

But there is more to SCinet than the speed. Planning and building the network builds knowledge and experience in the research and education community as the SCinet committee members must address interoperability, power, routing, measurement, security, wireless communications, and wide-area transport on a grand scale. When the volunteers return to their institutions, their knowledge and expertise are shared broadly and the research and education community as a whole benefits.

"SCinet is a remarkable undertaking. Volunteers including scientists, engineers, researchers and students from the United States, Canada, and Europe representing universities, industry, government, and US national laboratories collaborate in a yearlong effort to plan each year's event. The wide range of activities which make up the SCinet effort provides opportunities for participants to work with equipment vendors and commercial and research networks around the globe to design, build and showcase state-of-the-art technologies and innovative solutions that support the networking needs of all attendees, exhibitors and demonstrations.

This year vendors loaned approximately \$23M in equipment to build SCinet. Volunteers have the opportunity to attend the conference, to learn first hand from industry experts, to gain hands-on experience, to explore new technology, and to meet a broad range of experts in related fields. Each year SCinet volunteers survey the network landscape to bring to bear innovative, cutting-edge advances in networking to enhance the SC experience." Linda Winkler, Senior Network Engineer at Argonne National Laboratory and SC10 SCinet Routing Co-Chair.

To learn more about SC11 to be held Nov 12 - 18, 2011 in Seattle, Washington, see <http://sc11.supercomputing.org>.



QUILT FACT

92% offer technical support, consulting and/or training





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