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LEARN and OneNet to Be Connected to Pacific Wave

International cyberinfrastructure-based scientific research collaborations enhanced in Texas and Oklahoma through direct connections to Pacific Wave in El Paso and Tulsa

Berkeley, CA; Seattle, WA & Lubbock, TX – September 28, 2017 – With support from the National Science Foundation’s International Research Network Connections (NSF IRNC) program, two significant U.S. research and education networks (R&E), Texas’s Lonestar Education and Research Network (LEARN) and Oklahoma’s OneNet will be directly connected to the Pacific Wave International Exchange¹ and its peering and science DMZ fabrics.

Pacific Wave, Western Regional Network, and Pacific Research Platform

In addition to interconnecting most international Asia-Pacific networks, key U.S. Western regional R&E networks, leading national-scale research networks like Internet2 and ESnet who bring in all other research universities and facilities in the West, and major commercial research cloud services, Pacific Wave supports a wide array of international and domestic cyberinfrastructure-based scientific research collaborations which include: a pioneering multi-institutional science DMZ fabric that supports the Pacific Research Platform (PRP); an advanced Software Defined Exchange (SDX), Software Defined Networking (SDN), and related provisioning implementations (including ONOS and MEICAN, created by the national R&E network of Brazil, RNP); and a number of other advanced networking and collaboration tools and components, some in production, others under development.

“An explicit goal of Pacific Wave, and a goal shared by OneNet and LEARN, is to develop and deploy a curated set of advanced networking components and architectures that reach across large enough geographies (here the Asia-Pacific Region and the Western U.S.) and across critical masses of researchers, labs, data, computational resources, and scientific instruments. These efforts will empower researchers and research collaborations to achieve the network effects required to enable and accelerate the next waves of discovery in science, engineering, and medicine,” said Louis Fox, Principal Investigator of the NSF-funded Pacific Wave IRNC, and president and CEO of CENIC.

¹ See the map of the Pacific Wave International Exchange at the end of this news release.

LEARN and OneNet will connect to Pacific Wave via the Western Regional Network (WRN). WRN is an R&E extension of Pacific Wave, created and supported by a collaboration of the major Western Regional R&E optical networks: Front Range Gigapop (CO and WY), New Mexico Gigapop, University of Hawaii, Pacific Northwest Gigapop (WA, AK, MT, ND) and CENIC (CA). WRN employs a dedicated 100Gbps wavelength-based network infrastructure, including “dark channels” provided by Internet2, that spans the West and also reaches Pacific Wave’s international exchange point collaborator, StarLight, in Chicago, thereby making most European R&E networks directly accessible to WRN participants.

OneNet and Pacific Wave

OneNet, a division of the Oklahoma State Regents for Higher Education, operates the research and education network serving 100 percent of Oklahoma’s research universities, many of whom are eager to further leverage existing research, in areas like high energy physics, atmospheric science and predictive modeling, hydrology and water resources, machine learning, and genomic research efforts across the Asia-Pacific Region and the Americas.

Oklahoma is the home of the National Weather Center, a unique confederation of The University of Oklahoma, National Oceanic and Atmospheric Administration and state organizations that work together in partnership to improve understanding of events occurring in Earth’s atmosphere over a wide range of time and space scales. The scientific data collected, analyzed and generated within the programs housed at the National Weather Center are leveraged extensively globally.

The University of Oklahoma also operates the Advanced Radar Research Center (ARRC). Strong partnerships with the University of Kyoto University in Japan lead to the bi-annual International Symposium on Earth-Science Challenges (ISEC). ARRC focuses on:

- Advances in the remote sensing of the atmosphere
- Understanding, predicting, modelling of the atmosphere and data assimilation
- Hydrology and water resources, water-related disasters
- Extreme weather and climate variation
- Meteorological disaster resilience

“This new connection to Pacific Wave, which is facilitated via the Western Regional Network, will enable Oklahoma’s researchers to collaborate globally on a variety of initiatives through international partnerships,” said Vonley Royal, Executive Director and Higher Education Chief Information Officer, OneNet. “By having a Pacific Wave network node in Tulsa, many of OneNet’s member institutions will benefit from the enhanced connectivity to the Asia-Pacific Region and beyond, including the University of Oklahoma, Oklahoma State University, the National Weather Center, and the National Severe Storms Laboratory.”

LEARN and Pacific Wave

Lonestar Education and Research Network (LEARN) is a consortium of 40 organizations throughout Texas that includes public and private institutions of higher education, community colleges, the National Weather Service, K-12 schools, and other public service organizations. LEARN member universities and facilities like the Texas Advanced Computing Center (TACC) at the University of Texas at Austin, National Oceanic and Atmospheric Administration sites (NOAA), and the National Weather Service (NWS), all of whom have significant international research portfolios, will benefit from the partnership with Pacific Wave, to collaborate, share, and access computing and scientific data sets and global scale instruments across multiple scientific domains.

"LEARN's high-performance optical network supports scientists who participate in a wide range of national and global data-intensive research that often has life-changing impacts for humankind, said Pankaj Shah, president and CEO, of LEARN. "Texas-based scientists collaborate globally with counterparts who research genomics, neuroscience, infectious diseases, weather and climate, machine learning, and high-energy physics. Extending the Pacific Wave via a network node in El Paso will allow for frictionless scientific collaboration, exchange of large datasets, and access to global scale scientific tools and data."

For instance, TACC at the University of Texas at Austin provides a comprehensive set of cyberinfrastructure resources for an international community of researchers. Primarily supported by the National Science Foundation, TACC makes available an array of more than a dozen production computing and storage platforms, including the NSF-supported "Stampede 2" supercomputer, one of the fastest systems in the world, in use by thousands of researchers around the globe doing open science.

"In large part, the value of our systems are determined by the ability of engineers and scientists to get data in and out of the systems", according to Dan Stanzione, Executive Director at TACC. "Currently, TACC houses more than 60 petabytes of data in billions of files for users, and more than 15 terabytes of data each day flows in and out of our data center to and from users around the country and around the world. Connection to Pacific Wave will enhance the movement of data between and among the international research community".

TACC has numerous collaborations with institutions in the region covered by Pacific Wave, and enhanced connectivity would make existing collaborations easier, and facilitate new ones as well. In the area of natural hazard modeling and mitigation, TACC houses the DesignSafe project, the cyberinfrastructure component of the Natural Hazards Engineering Research Infrastructure (NHERI). NHERI experimental facilities at UC San Diego and in Oregon, a simulation center at Stanford, and the Southern California Earthquake Center at the University of Southern California, all of which store data with DesignSafe, will all see enhanced connectivity to TACC as a result of the new connections.

About Pacific Wave ♦ pacificwave.net

Today, Pacific Wave, a project of the Corporation for Education Networking in California (CENIC) and Pacific Northwest Gigapop (PNWGP), includes the following facilities and capabilities:

- Pacific Wave enables science-driven high-capacity data-centric networks, enabling researchers to move data between collaborator sites, supercomputer centers or Science DMZs without performance degradation
- Peering, with multiple open exchange peering points available at three U.S. Pacific coast locations, including the Bay Area (Sunnyvale and Palo Alto), Los Angeles (three sites), and Seattle; three U.S. interior locations in Denver, Albuquerque, and El Paso; and two sites in Tokyo, Japan. More than 16 major, internationally-recognized research and education networks are among its dozens of participants. The distributed design of Pacific Wave allows participants to engage in bilateral peerings regardless of which node they are physically connected to. This design offers significant flexibility and opportunities for networks utilizing any of a dozen trans-Pacific cables for their circuits as well as for building redundancy and robustness into peering relationships that would otherwise be cost prohibitive and complex to engineer. Current participants represent networks and agencies from throughout the Pacific Rim including Australia, Canada, China, Japan, Korea, Mexico, New Zealand, Qatar, Singapore, Taiwan, and the United States
- A full function research DMZ platform spanning Seattle, Sunnyvale and Los Angeles with dedicated 100Gbps backbone augmented with extensions throughout the western United States and Chicago that is patterned on, and connects to, the pioneering ESnet Science DMZ capability and which presently hosts the new NSF-funded Pacific Research Platform (PRP)
- Multiple, geographically diverse 100Gbps connections – in Seattle, Los Angeles and Chicago – to Internet2's backbone nodes and full range of advanced network capabilities
- A SDX testbed with access points in Los Angeles, Seattle and Sunnyvale, and including teaming relationships with StarLight, WIDE/T-REX and others to pilot more global interoperability of next generation SDX capabilities
- A dedicated SDN testbed with access points in Los Angeles, Seattle and Sunnyvale, and including a teaming arrangement with StarLight, WIDE/T-REX and others to pilot more global interoperability of next generation SDN capabilities

About LEARN ♦ www.tx-learn.net

The Lonestar Education And Research Network (LEARN) is a consortium of 40 organizations throughout Texas that includes public and private institutions of higher education, community colleges, the National Weather Service, and K-12 public schools, and other public service organizations. The consortium, organized 13 years ago as a 501(c)(3) non-profit organization, connects its members and over 500 affiliated organizations through high performance optical and IP network services to support their research, education, healthcare and public service missions. LEARN is also a leading member of a national community of advance research networks, providing Texas connectivity to national and international research and education networks, enabling cutting-edge research that is increasingly dependent upon sharing large volumes of electronic data.

About OneNet ♦ onenet.net

OneNet is the comprehensive digital communications initiative of Oklahoma State Regents for Higher Education and Oklahoma's only statewide internet service provider. OneNet leverages local, national, public and private partnerships to provide world-class broadband connectivity to institutions that sustain communities and enrich lives. OneNet's mission is to advance technology across Oklahoma. OneNet's high performance optical network meets the mission-critical needs of Oklahoma's education, research, health care and public service communities. OneNet also partners with other research and education networks across the country to connect Oklahoma to research programs throughout the nation and around the globe. Serving the diverse set of research and education needs of Oklahoma, OneNet has developed and operated a statewide fiber backbone with an 100Gbps infrastructure serving Oklahoma's largest research institutions. OneNet operates one of the two Great Plains Network 100Gbps on-ramps to Internet2, as well as directly connects to other statewide research networks through Internet2.

About the Pacific Research Platform ♦ prp.ucsd.edu

From biomedical sciences to particle physics, nearly all of today's research and data analysis involve remote collaboration. To work effectively and efficiently on multi-institutional projects, researchers depend heavily on high-speed access to large datasets and computing resources. Helping meet the needs of researchers in California and beyond, the National Science Foundation (NSF) awarded a five-year, \$5 million grant to fund the Pacific Research Platform (PRP, prp.ucsd.edu). The PRP integrates Science DMZs (fasterdata.es.net/science-dmz/), an architecture developed by the U.S. Department of Energy's Energy Sciences Network (ESnet), into a high-capacity regional "freeway system." This system makes it possible for large amounts of scientific data to be moved, without performance degradation, between scientists' labs and their collaborators' sites, super-computer centers, or data repositories. Led by researchers at UC San Diego and UC Berkeley, the PRP enables fast and secure data transfers between researchers at more than 20 universities, and supports a broad range of data-intensive research projects in areas such as cancer genomics, cultural preservation, galaxy evolution research, climate modeling, and the creation of virtual reality gaming systems. PRP leverages Pacific Wave's rich international and domestic peering fabric, and is implemented across the Pacific Wave's science-DMZ infrastructure, which in turn is provisioned on 100Gbps waves, many of which derive from CENIC's and PNWGP's infrastructure collaborations with Internet2.



About CENIC | www.cenic.org

CENIC connects California to the world—advancing education and research statewide by providing the world-class network essential for innovation, collaboration, and economic growth. This nonprofit organization operates the California Research & Education Network (CalREN), a high-capacity network designed to meet the unique requirements of over 20 million users, including the vast majority of K-20 students together with educators, researchers, and others at vital public-serving institutions. CENIC’s Charter Associates are part of the world’s largest education system; they include the California K-12 system, California Community Colleges, the California State University system, California’s Public Libraries, the University of California system, Stanford, Caltech, USC, and the Naval Postgraduate School. CENIC also provides connectivity to leading-edge institutions and industry research organizations around the world, serving the public as a catalyst for a vibrant California.

For more information:

www.tx-learn.net

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