Software Defined Infrastructure Paper
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CENIC has received an NSF Award (ACI-1451050) to enhance and expand the Pacific Wave International Exchange. In addition to the expansion of Pacific Wave to accept the growing number of trans-Pacific 100G circuits, the project includes the development of a parallel set of network facilities comprising a distributed Software Defined Exchange to support the emerging demand for the interconnection of international Software Defined Networks.

The Pacific Wave SDX is being developed as a parallel infrastructure specifically for the purposes of avoiding service disruptions to the production Pacific Wave Exchange. SDN/SDX experimentation will be performed within the physically separate SDX switches using dedicated 10G channels (up to 3x10G if necessary) between those switches, as well as virtual channels across the 100Gbps infrastructure.

Existing Pacific Wave participants on the production exchange can connect to the SDX platform by means of a VLAN providing transport through the exchange at up to 100Gbps. Optionally, participants can connect directly to the SDX platform, either as a replacement for or as an augmentation to their existing Pacific Wave connection.

As SDN/SDX continues to mature and stabilize as a quality production service Pacific Wave will be able to incrementally migrate production services without unscheduled disruptions.

Pacific Wave and Starlight have committed to making our implementations of a Software Defined Exchange interoperable and have recently completed the deployment of two 100G circuits between the exchanges in support of research and development.

I am the Project Manager responsible to the Principle Investigator (Louis Fox) for the NSF IRNC award to CENIC. My previous role with CENIC was as their Chief Technology Officer. My interest in this workshop is to engage with others in defining and understand how Software Defined Exchanges will serve the R&E networking environment, and in particular, how we are going to secure these networks and controllers going forward.

CENIC and Pacific Wave are committed to support and development of the SDX testbed for the 5-year term of the grant and continuation beyond the end of the grant as demand continues.

PACIFIC WAVE

INTERNATIONAL PEERING EXCHANGE

NORDUNet
Nordic Countries

JANET
United Kingdom

SURFnet
Netherlands

GEANT
Europe

USLHCNet
CERN

StarLight

Chicago

FRGP   ESnet   Internet2

UltraLight
(LHCnet)

Albuquerque   ABQG

DREN

El Paso

CUDI
Mexico

Denver

CANARIE   ESnet   Internet2

PNWGP
100gbps

DREN

NREN
(NASA Ames)

CENIC

CENIC   DREN

Vancouver   Seattle

Los
Nettos   Tijuana

Los
Angeles

PACIFIC WAVE
BACKBONE

San Francisco
Bay Area

UH
Hawaii

UH
Oahu

REANNZ
New Zealand

Pacific Wave
TransPacific
100gbps

AARNET
Australia

GEMNet2

JGN-X   NII/SINET
Japan

TransPAC

TWAREN
TANET
Taiwan

KISTI
KREONET
Korea

CSTNET
GLORIAD
Hong Kong

CERNET
China

NUS-GIGAPOP
Singapore

QATAR
FOUNDATION
Qatar

WESTERN REGIONAL NETWORK
States served by WRN members:

PNWGP: Washington, Montana,
Alaska, Oregon & Idaho
FRGP: Colorado and Wyoming
ABQG: Albuquerque GigaPoP
UH: Hawaii
CENIC: California

Pacific Wave POPs

Pacific Research Platform (PRP)

PRP Science DMZ Fabric

Software Defined Network

Commercial Peering Points
(Amazon, Google, & Microsoft)

SPEEDS/POPS

1 Gbps

2.5 Gbps

10 Gbps

40 Gbps

100 Gbps