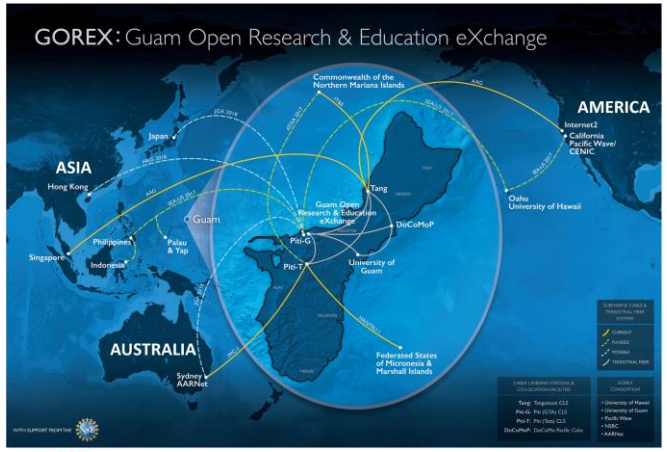
NSF Campus Cyberinfrastructure PI and
Cybersecurity Innovation for Cyberinfrastructure PI Workshop
October 3-4, 2017 | Albuquerque, NM

Quad Chart for: *CC* Network Design: Upgrading the University of Guam Network to Connect to Internet2 and Create a Science DMZ*

Challenge:

- **No Research and Education Network** Connectivity (previous connection speed: 150 Mb)
- **Inadequate Campus Network Design**
- **Lack of CyberTeam** with R&E Networking knowledge and experience

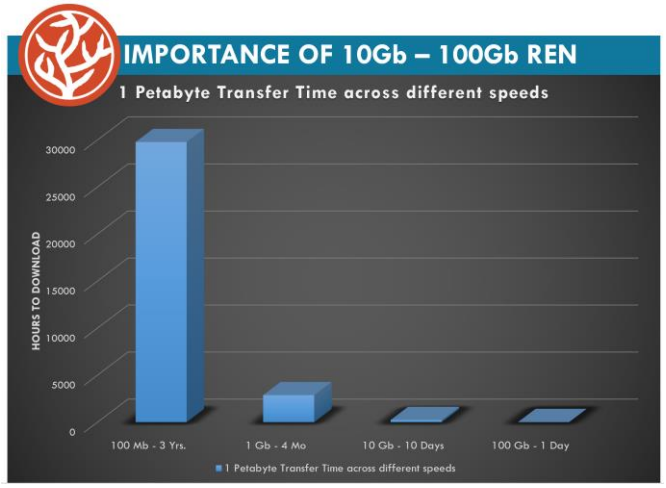


Broader Impact:

- Access to 10Gb REN via Science DMZ and UH 100 Gb circuit.
- University **CyberTeam** will enable connectivity and implement **CyberInfrastructure Plan** Best Practices
- **GOREX**: Will connect Asia, Australia, and America; will enable Pacific islands REN connectivity

Solution(s):

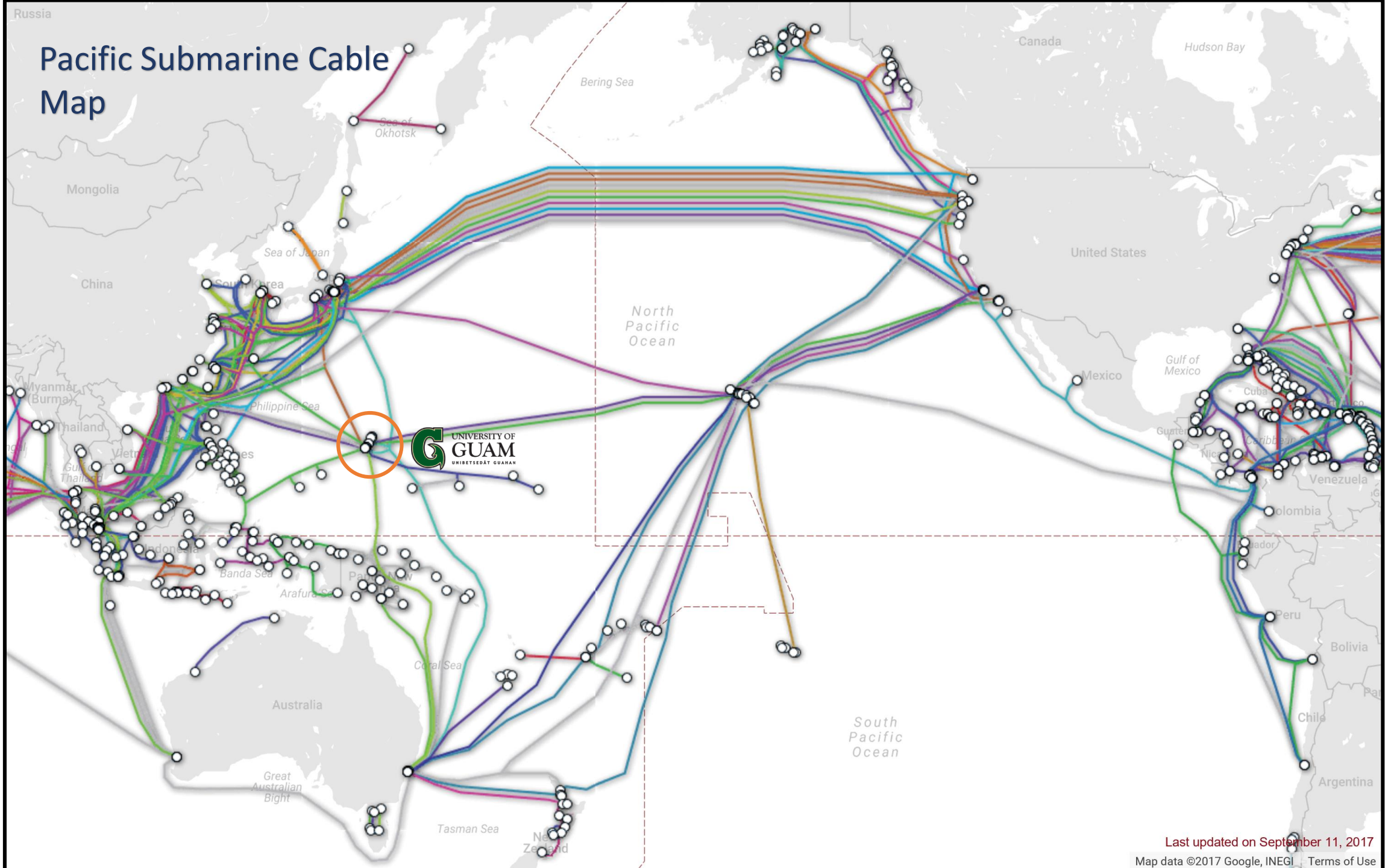
- **CyberInfrastructure Plan** – Work with leadership institutes to implement best practices
- **CyberConnectivity** – Establish ultra-high-speed global REN connectivity (GOREX)
- **CyberTeam** – Work with leadership institutes to develop the skillsets



Metadata tag:

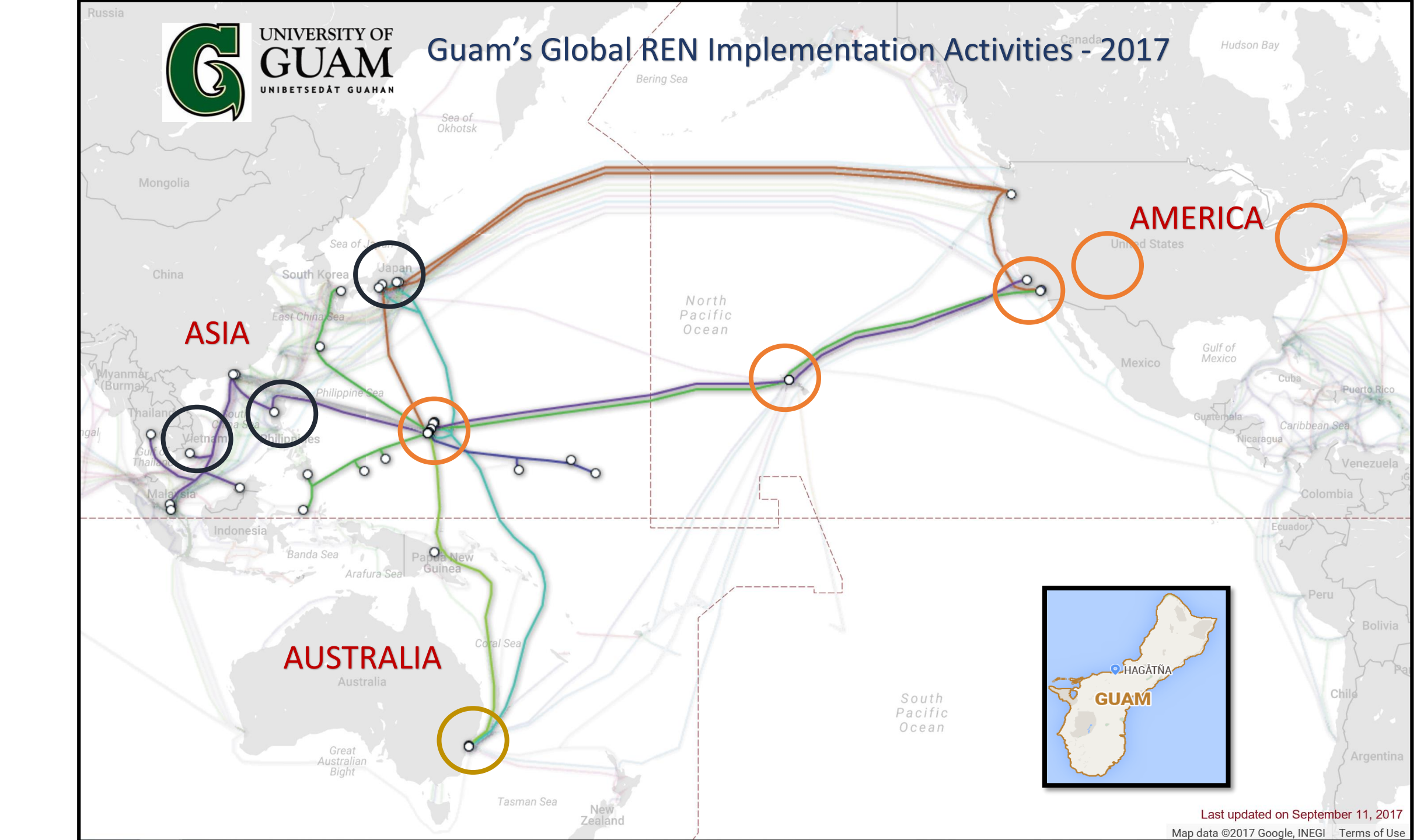
- *Guam EPSCoR CyberInfrastructure*
- *University of Hawaii - PIREN*
- *NSRC Campus Network Design Training at UoG*

Pacific Submarine Cable Map



UNIVERSITY OF GUAM
UNIBETSEDÅT GUAHAN

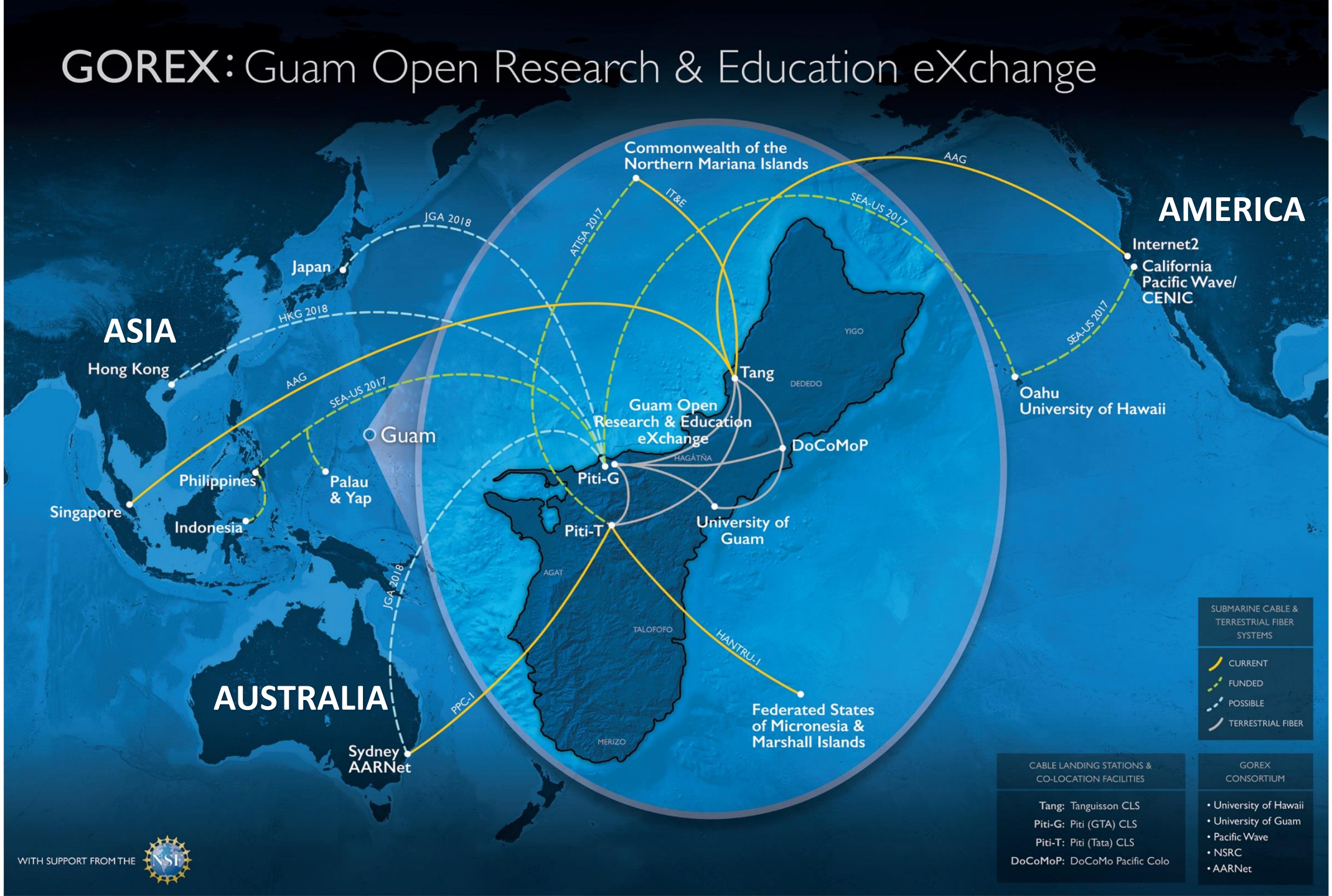
Guam's Global REN Implementation Activities - 2017



Last updated on September 11, 2017

Map data ©2017 Google, INEGI Terms of Use

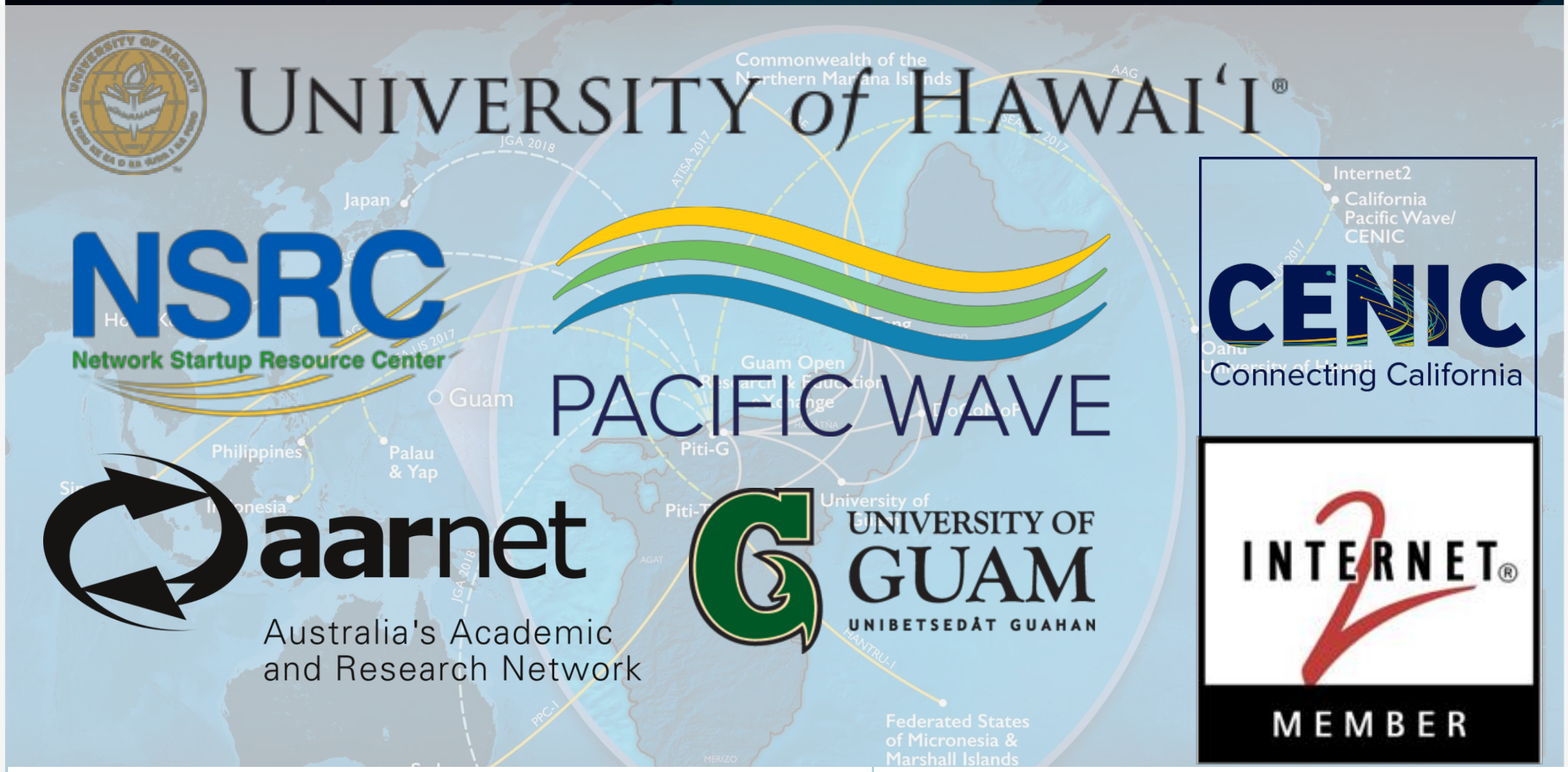
Sea of Okhotsk
Mongolia
Sea of Japan
China
South Korea
Japan
East China Sea
North Pacific Ocean
Philippine Sea
Myanmar (Burma)
Thailand
South China Sea
Vietnam
Philippines
Gulf of Thailand
Malaysia
Indonesia
Banda Sea
Arafura Sea
Papua New Guinea
Coral Sea
NT
QLD
Australia
WA
HI
BC
SK
WA
MT
OR
ID
WY
NV
UT
CO
CA
AZ
NM


GOREX: Guam Open Research & Education eXchange
AMERICA
ASIA
AUSTRALIA
Commonwealth of the Northern Mariana Islands
Internet2
California Pacific Wave/ CENIC
Oahu University of Hawaii
Japan
Hong Kong
Singapore
Philippines
Indonesia
Palau & Yap
Guam
Tang
Guam Open Research & Education eXchange
DoCoMoP
Piti-G
Piti-T
University of Guam
Federated States of Micronesia & Marshall Islands
Sydney AARNet
AAG
SEA-US 2017
JGA 2018
HKG 2018
ATISA 2017
IT&E
PPC-1
HANTRU-1
YIGO
DEDEDO
HAGÅTÑA
AGAT
TALOFOFO
MERIZO
SUBMARINE CABLE & TERRESTRIAL FIBER SYSTEMS
CURRENT
FUNDED
POSSIBLE
TERRESTRIAL FIBER
CABLE LANDING STATIONS & CO-LOCATION FACILITIES
Tang: Tanguisson CLS
Piti-G: Piti (GTA) CLS
Piti-T: Piti (Tata) CLS
DoCoMoP: DoCoMo Pacific Colo
GOREX CONSORTIUM
• University of Hawaii
• University of Guam
• Pacific Wave
• NSRC
• AARNet
WITH SUPPORT FROM THE NSF

GOREX GOALS

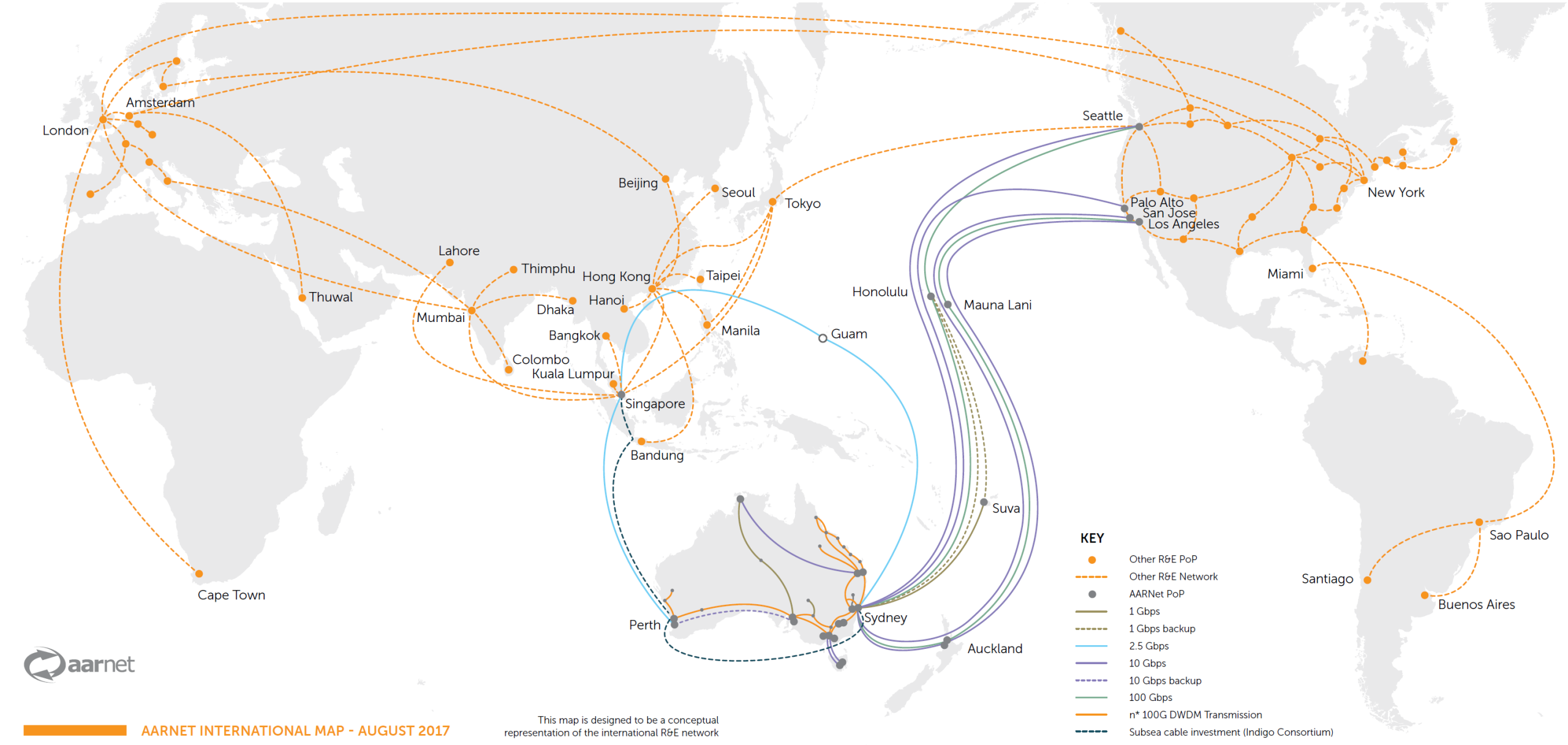
- Leverage strategic geographic location of Guam
- Establish Open R&E Exchange
  - Inter-Connect existing, funded, and planned high capacity R&E trans-pacific circuits
- Improve Pacific-wide transport **diversity** and **resilience**
  - Support global R&E networks
  - Facilitate greater access to global R&E networks by Pacific Island nations and communities
- Overarching Goal:
  - Promote increased growth and effectiveness of data-intensive and highly collaborative research and education activities engaging the Asia-Pacific region with the global R&E community.

GOREX: Guam Open Research & Education eXchange



National Science Foundation
WHERE DISCOVERIES BEGIN

REANNZ



aarnet

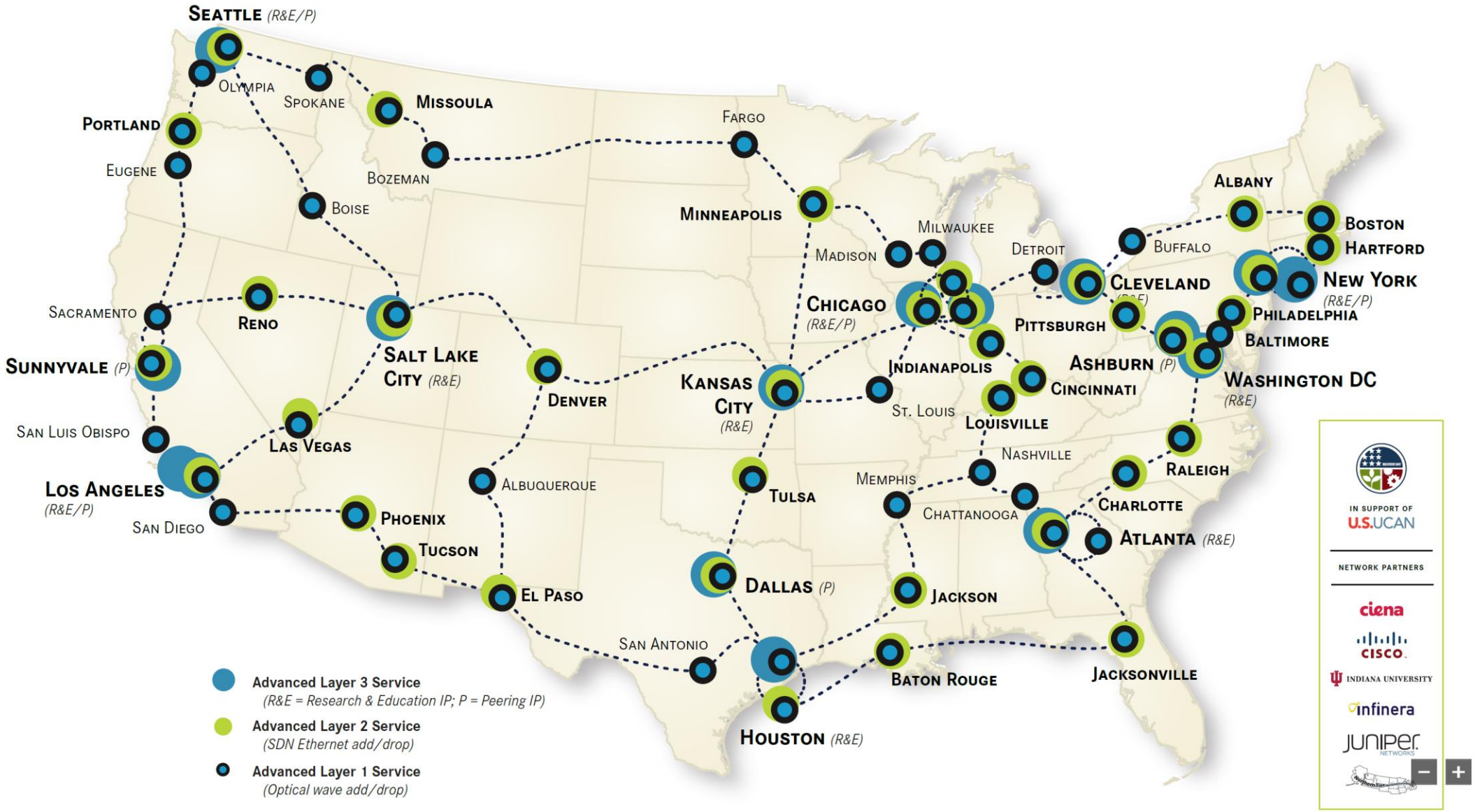
AARNET INTERNATIONAL MAP - AUGUST 2017

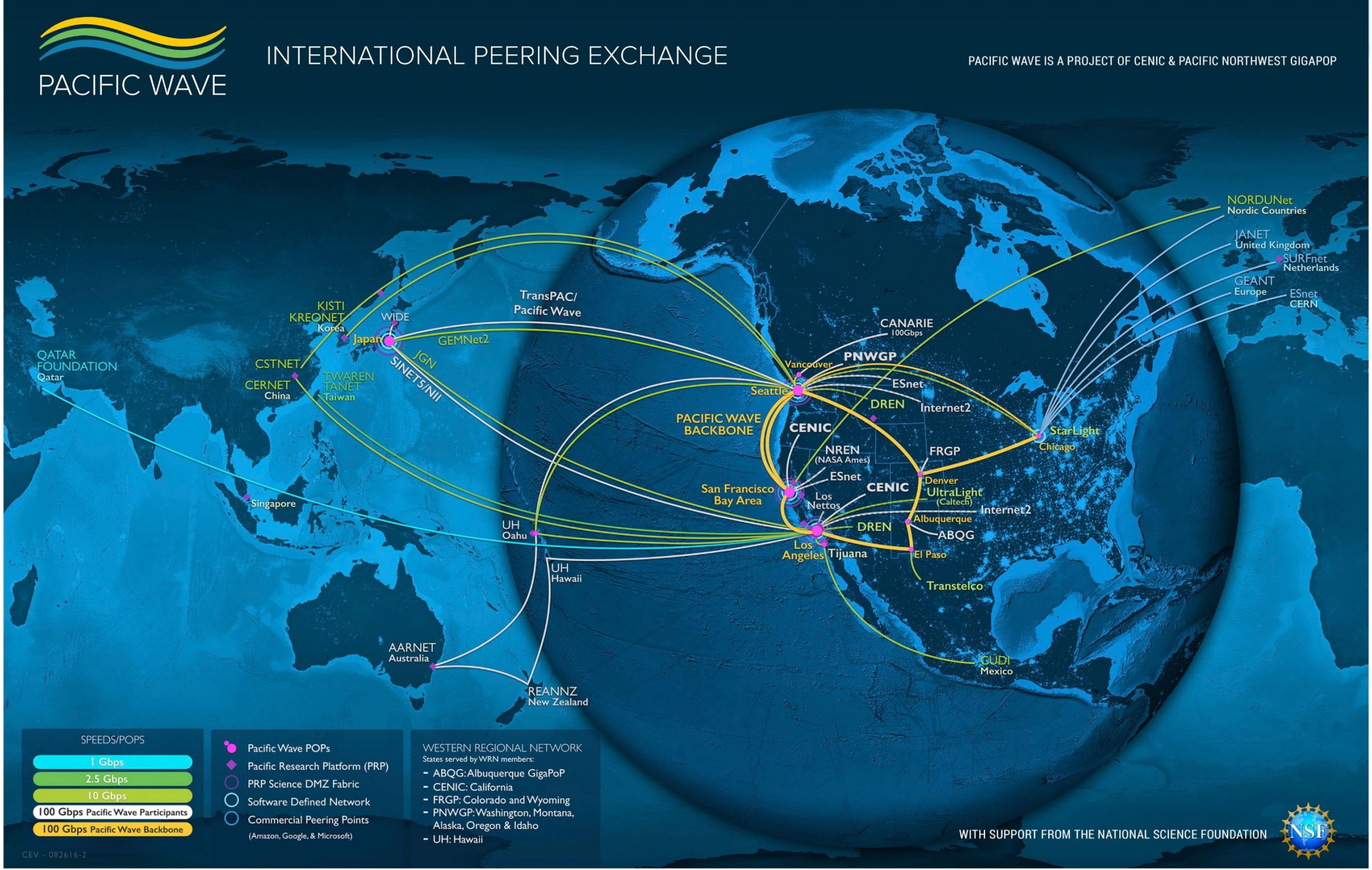
This map is designed to be a conceptual representation of the international R&E network

INTERNET2

INTERNET2 NETWORK INFRASTRUCTURE TOPOLOGY

APRIL 2016




PACIFIC WAVE
INTERNATIONAL PEERING EXCHANGE
PACIFIC WAVE IS A PROJECT OF CENIC & PACIFIC NORTHWEST GIGAPOP
NORDUNet
Nordic Countries
JANET
United Kingdom
SURFnet
Netherlands
GEANT
Europe
ESnet
CERN
KISTI
KREONET
Korea
WIDE
Japan
TransPAC/
Pacific Wave
GEMNet2
JGN
SINET5/NII
CANARIE
100Gbps
QATAR
FOUNDATION
Qatar
CSTNET
CERNET
China
TWAREN
TANET
Taiwan
Vancouver
PNWGP
Seattle
ESnet
DREN
Internet2
PACIFIC WAVE
BACKBONE
CENIC
StarLight
Chicago
NREN
(NASA Ames)
FRGP
ESnet
CENIC
Denver
UltraLight
(Caltech)
San Francisco
Bay Area
Los
Nettos
Internet2
Albuquerque
DREN
ABQG
Singapore
UH
Oahu
Los
Angeles
Tijuana
El Paso
UH
Hawaii
Transtelco
AARNET
Australia
GUDI
Mexico
REANNZ
New Zealand
SPEEDS/POPS
1 Gbps
2.5 Gbps
10 Gbps
100 Gbps Pacific Wave Participants
100 Gbps Pacific Wave Backbone
Pacific Wave POPs
Pacific Research Platform (PRP)
PRP Science DMZ Fabric
Software Defined Network
Commercial Peering Points
(Amazon, Google, & Microsoft)
WESTERN REGIONAL NETWORK
States served by WRN members:
- ABQG: Albuquerque GigaPoP
- CENIC: California
- FRGP: Colorado and Wyoming
- PNWGP: Washington, Montana, Alaska, Oregon & Idaho
- UH: Hawaii
WITH SUPPORT FROM THE NATIONAL SCIENCE FOUNDATION
NSF
CEV - 082616-2

UNIVERSITY OF GUAM EPSCoR

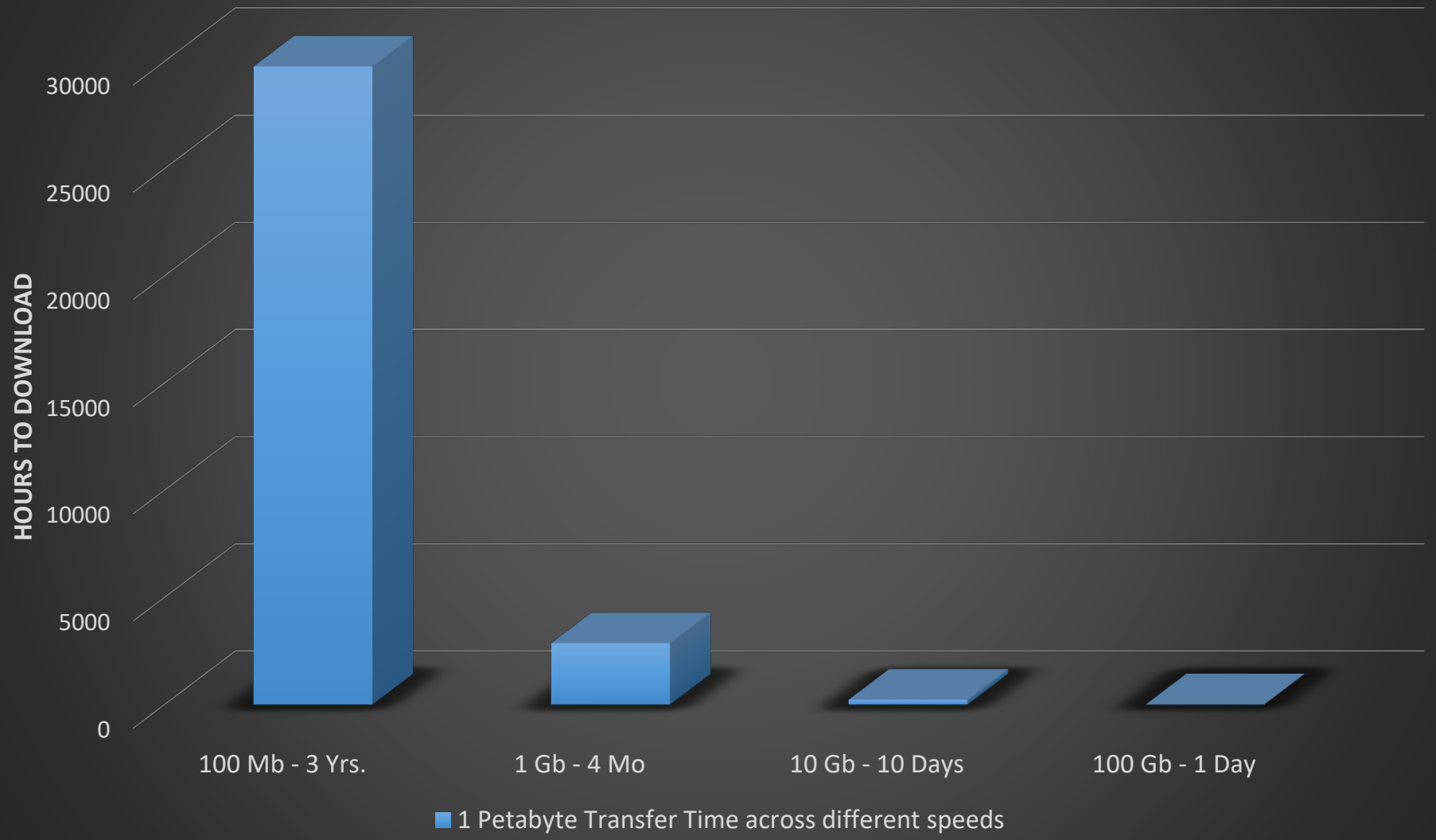
$6 Million - Initial Grant

- Oceanography
- Coral Reef Resiliency

WITH SUPPORT FROM THE NSF

IMPORTANCE OF 10Gb – 100Gb REN

1 Petabyte Transfer Time across different speeds



CC Network Design: University of Guam Solutions*

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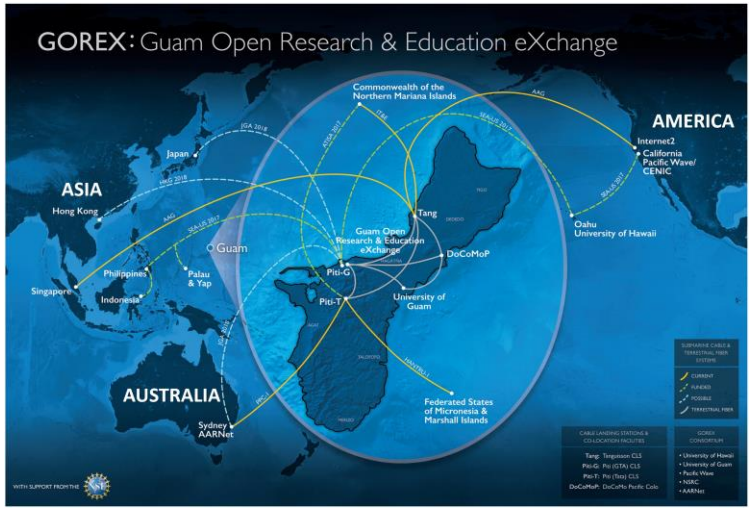

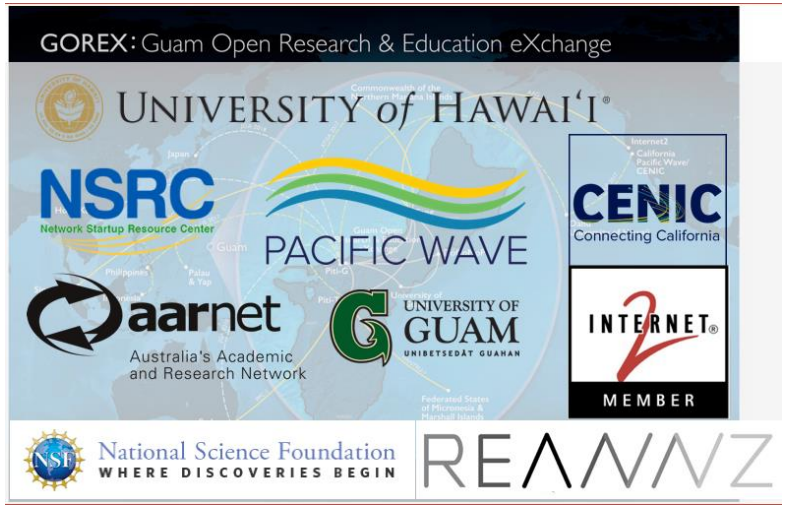

Network Startup Resource Center

NSRC
Network Startup Resource Center

Campus Network Design 5-day Workshop **(July 25-30th, 2016)**

I. University of Guam
II. Palau Community College and Palau Ministry of Education
III. College of Micronesia – Federated States of Micronesia
IV. College of Marshall Islands
V. Northern Marianas College – CNMI
VI. Guam Department of Education
VII. Guam Community College
VIII. Trainers: University of Oregon, University of Hawaii, NSRC

(ACI 1451045 - IRNC Engage)

UNIVERSITY OF GUAM
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WITH SUPPORT FROM THE NSF

Thank you

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uognoc@uog.edu