International Networks at Indiana University

2019 Overview

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International Networks at Indiana University

IN@IU

Team

- Based in Bloomington, IN
- Directed by Dr. Jennifer Schopf
- Partner closely with the GlobalNOC (operates Internet2, NOAA, State Networks, etc.) and ESNet
- 4 active NSF awards (3 IRNC, 1 CC*)

Focus Areas

- Circuits to support US science collaborations
- Extensive international collaborations and relationship building
- Understanding circuit usage
- Improving performance

IN@IU Active Projects

- TransPAC4: Pragmatic Application-Driven International Networking
- NEAAR: Networks for European, American, and African Research
- NetSage: An Open, Privacy-Aware, Network Measurement, Analysis, and Visualization Service
- EPOC: Engagement and Performance Operations Center

TransPac Basics

- IRNC-BackBone- TransPAC4 - Pragmatic Application-Driven International Networking
- February 27, 2015-March 1 2020 (5 years)
- $4,800,000
- PI: Jennifer M Schopf, IU
- Partners:
  - International: APAN, Asi@Connect/TEIN, GEANT, NICT, NII, CERNET, SingAREN
  - Domestic: ESNet, Internet2, Pacific Wave

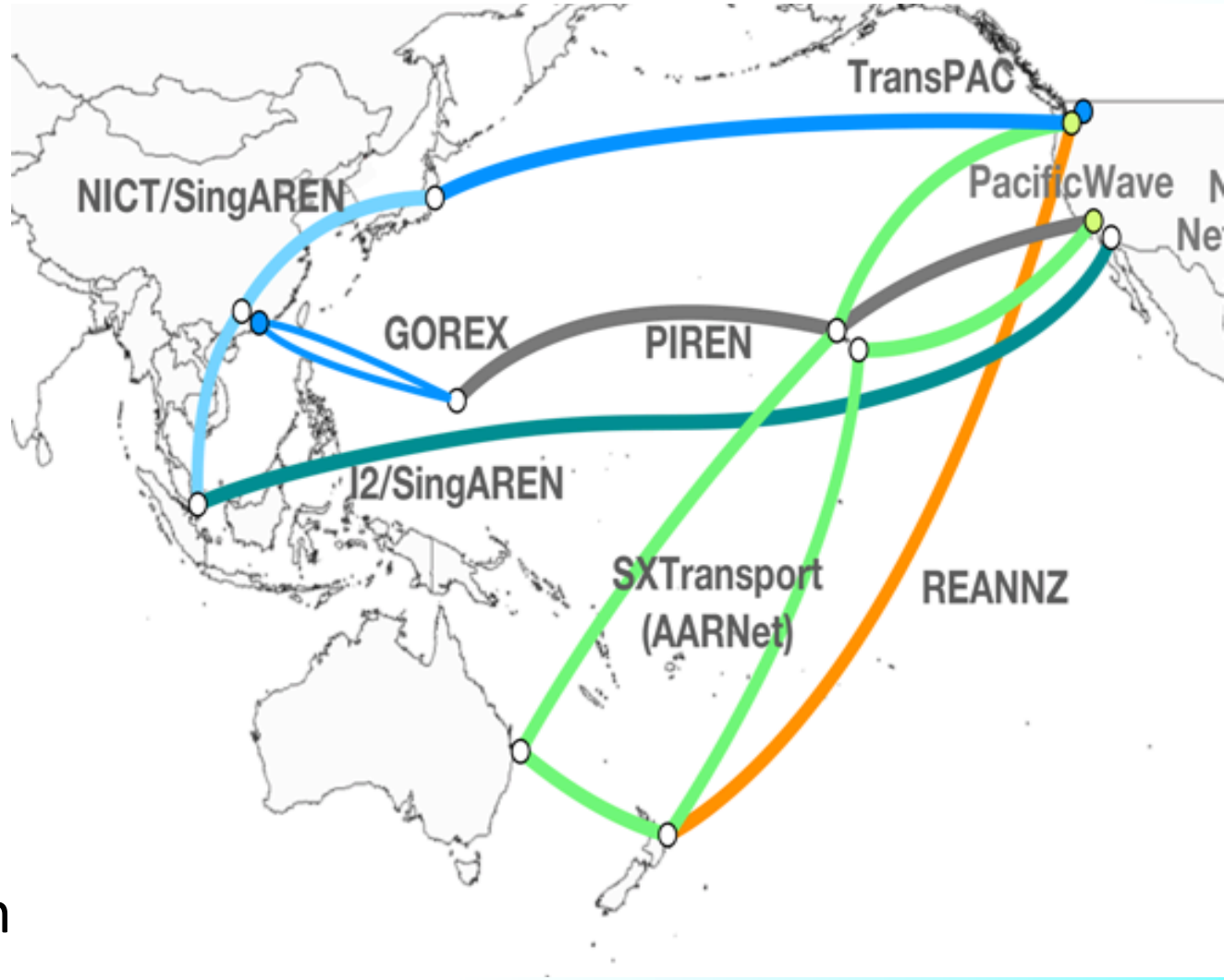
Current TransPAC activities

Circuits

- 100GB Seattle - Tokyo
- 2 10GBs Guam <> Hong Kong
- Asia Pacific Ring; GNA
- Backup agreements

LHCONE relevant

- 2018 - VLAN extended across JGN Tokyo-HK circuit – ESNet peering with TEIN and JGN
- 2019 - Peering between the ESNet LHCONE VRF in LA and LHCONE VRF in HK via Guam



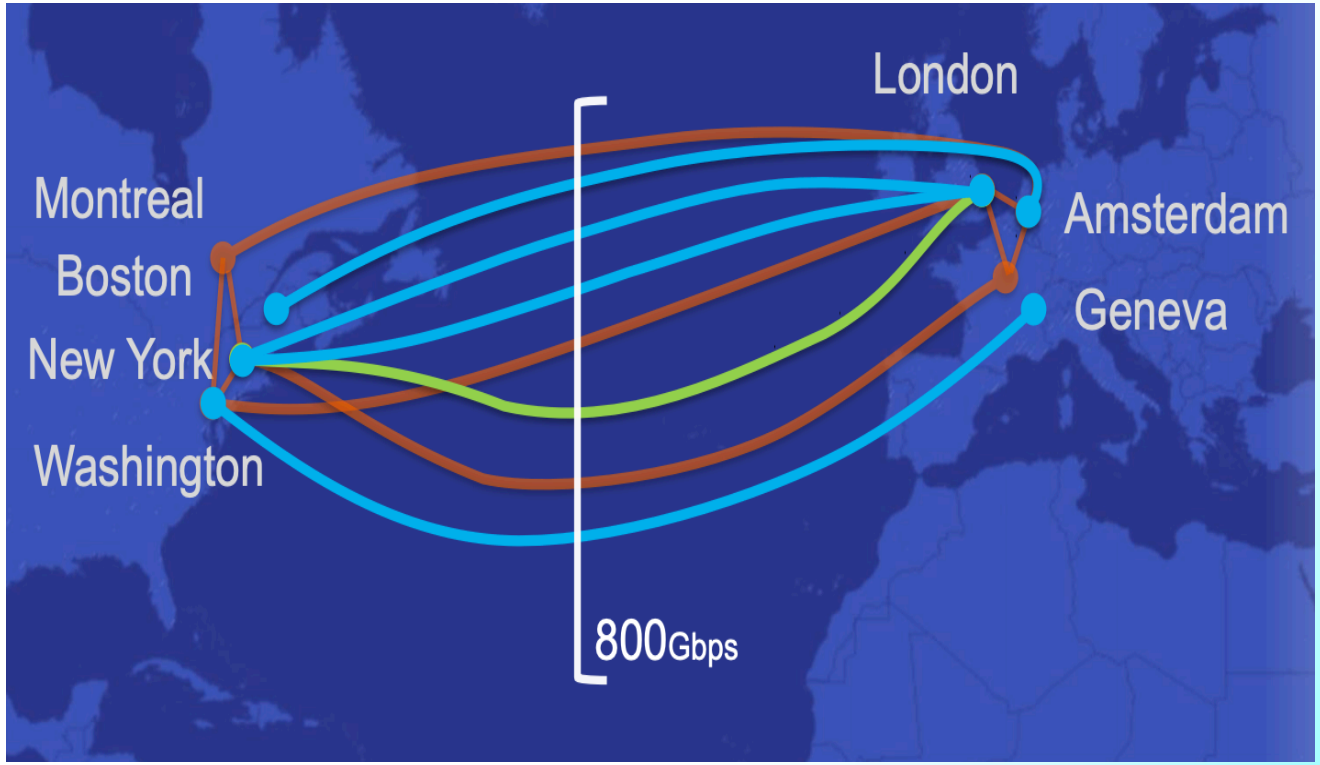
NEAAR Basics

- IRNC: Backbone: NEAAR: Networks for European, American, and African Research
- September 1, 2016 - August 31, 2020 (4 years); $3,250,000
- Partners: Indiana University, GEANT, UbuntuNet Alliance, WACREN, ASREN, SANReN

Current NEAAR Activities

Circuit

- 100GB New York – London
- ANA/GNA
- Backup agreements
- Load balancing with ESNet
- Peerings with WACREN, UbuntuNet Alliance
- pS trainings



More than Circuits

- Relationship Building and Management
- Understanding Users (HEP, Bioinformatics, Geoscience)
- Understanding network performance (routing analysis)
- Using and Promoting Effective tools and technologies to improve performance (“Science” Engagement)
- REN advocacy and Knowledge Exchange
- Training and Capacity Building

NetSage Basics

- IRNC: AMI: NetSage - An Open, Privacy-Aware, Network Measurement, Analysis, and Visualization Service
- May 1, 2015-April 30, 2020 (5 years)
- $5,000,000 plus a $450,000 supplement in Sept ’17
- NetSage advanced measurement services for R&E data traffic
- Better understanding of current traffic patterns across instrumented circuits
- Performance information for data transfers
- How used are the links?
  - Where are congestion points?
  - What are the top sites using the my circuits?
  - What are the top sources/destinations for an organization?
  - Who’s using my archive?

NetSage Data Sources

- SNMP data (Passive) - Basic bandwidth data
- perfSONAR (Active)
  - Active tests between sites
- Flow data from routers (Passive)
  - Only de-identified data collected by NetSage
- Tstat-based traffic analysis for archives (Passive)
  - TCP flow statistics: congestion window size, number of packets retransmitted, etc
  - Also de-identified before stored

Examples

- Public NetSage links shown
- IRNC Bandwidth Dashboard:
  - http://portal.netsage.global
- Flow data over the Guam-HK link
  - https://portal.netsage.global/grafana/d/xk26IFhmk/flow-data?from=now-30d&to=now&orgId=2&var-Sensors=TransPAC%20Hong%20Kong%20sFlow&var-source_scope=meta.src_organization.keyword&var-dest_scope=meta.dst_organization.keyword
- ANA Dashboard
  - https://ana.netsage.global/grafana/d/000000003/bandwidth-dashboard?orgId=2

Ongoing: NetSage Science Registry

- A tool to understand science use of networks
- As part of flow collection process, we add tags
  - ASN
  - Organization
  - Science project and science discipline, if known
- Then the end of the IP address is removed
- Currently ~300 entries
- Only 15-20% of data is tagged right now

Routing Analysis

- Routes get put in place, rarely get updated
- At this time, many routes are
  - Overly complicated
  - Based on political considerations
  - Full of human errors
  - Delaying data transfers in many places
- Focusing on correcting routing errors via
  - Detection
  - Debugging
  - Work with community

EPOC Basics

- Joint project between Indiana University and ESnet
- Part of CC* program for science support
- $3.5M over 3 years
- Partnerships with regional, infrastructure, and science communities that span the NSF and DOE continuum of funding

EPOC Five Main Focus Areas

1. Roadside Assistance and Consulting
2. Application Deep Dives
3. Network Analysis (NetSage)
4. Services “in a box” (DMZ, testpoint in a box, etc)
5. Training

https://epoc.global/