

# Networks for European, American, and African Research: NEAAR



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# NEAAR: Networks for European, American, and African Research

- **Funding from US National Science Foundation**
  - \$3.25M over 4 years
- **Partners:**
  - Indiana University
  - GEANT
  - UbuntuNet Alliance
  - WACREN
  - ASREN
  - SANREN/TENET
- **With additional letters of support from 8 Application groups, NSRC, Internet2, ESNet, +**

# History: ACE

- **ACE: America Connects to Europe**
  - Jim Williams, IU PI
  - 2010, ~\$5M
- **Joint with GEANT**
- **Funded 6x10G links US to Europe**
- **Additional funding in 2013 to support application use of ANA 100G link**
- **Emphasis on science, monitoring**

# History: NSF International Networks

- **2014 solicitation excluded Europe and Africa**
- **Dec 2015 new solicitation**
  - **100G US to Europe**
  - **Could fund network to Africa or some collaborative work there as well**



# History: Timeline

- **Dec 20 – Cathrin Stover and I spoke by phone – Agreement GEANT will be EU partner**
- **Dec 22 –to explore collaborative opportunities, we contacted:**
  - **Ubuntunet Alliance: Pascal Hoba, Joe Kimali**
  - **WACREN: Boubakar Barry**
  - **ASREN: Yousef Tourmen**
  - **TENET: Duncan Greaves**

# Goals

- **Enable additional science collaborations between Africa and US (as well as between Europe and US)**
- **Enable measurement and monitoring to understand performance**
- **Collaborate to deploy exchange point**
- **Work closely with regional partners to meet their needs**

# Constraints

- **All network connections had to have a US endpoint**
  - **100G to EU required**
  - **Funding after that was not possible to extend to Africa**
- **NSF will not fund network connections within Africa**
- **NSF can't fund non-US salaries**

# Constraints 2

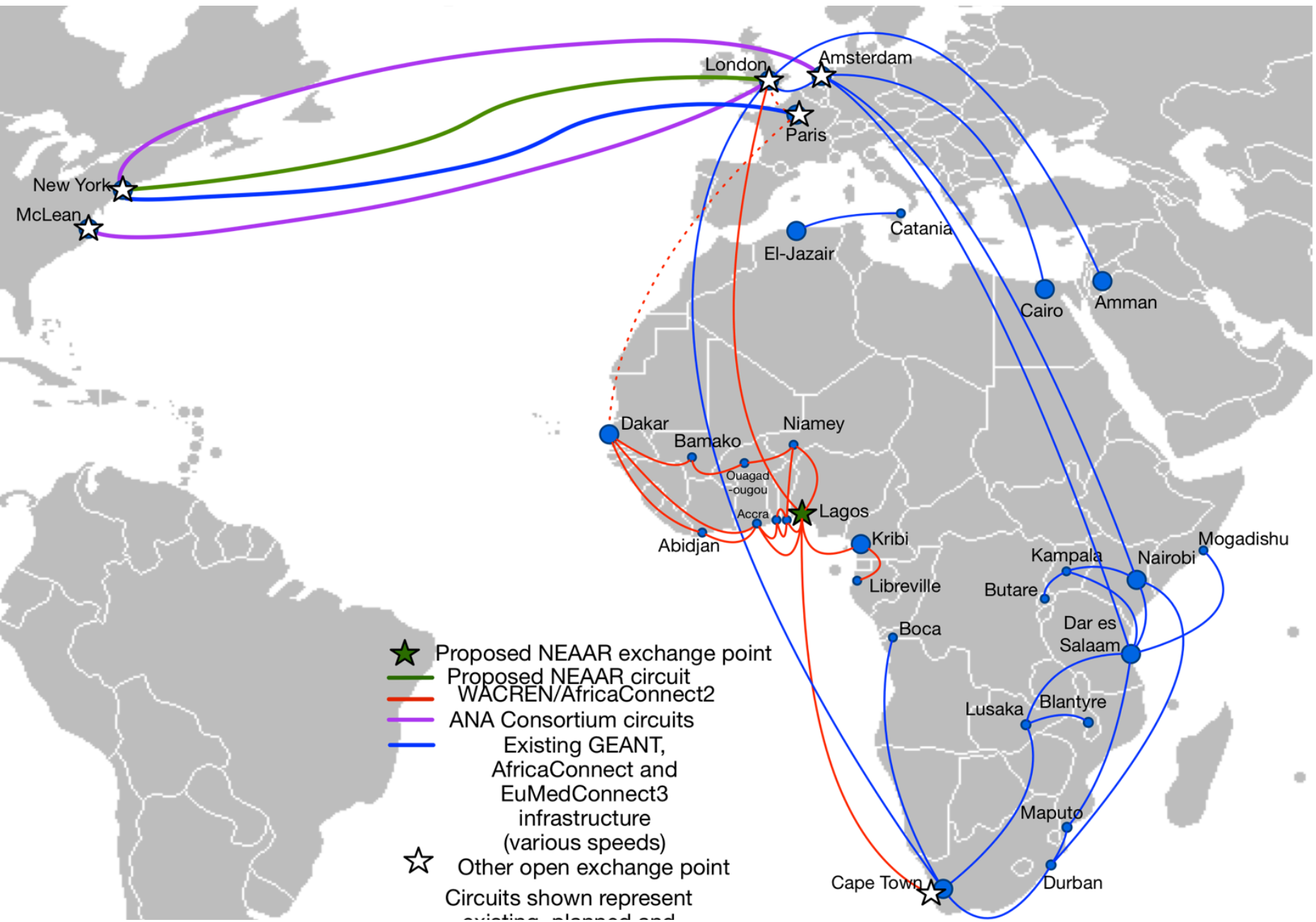
- **NSF can fund some travel**
  - **US staff to EU/Africa, African/EU staff to US**
- **NSF can fund workshops**
- **NSF can fund some equipment**
  - **Requests for 3 exchange points was cut down to only 1**

# History: Timeline cont.

- **Jan-Mar**
  - Multiple phone calls with interested parties
  - Regional RENs select Pascal Hoba as representative PI
  - Drafts available for comment
  - Solicited application groups as well
- **March 18 submission**
- **May – request for response to reviewer comments**
  - Supplied an addition 35 pages to NSF
  - Budget cut and evaluation
- **Sept 15 – notified of funding**

# NEAAR Networking in a Nutshell

- **100G circuit US to Europe, in part to support R&E traffic from Africa**
  - RFP currently out
  - Will overlap with ACE circuit
- **Exchange point and data transfer node (DTN) in Western Africa**

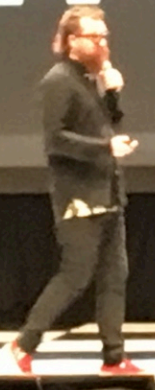


★ Proposed NEAAR exchange point  
 — Proposed NEAAR circuit  
 — WACREN/AfricaConnect2  
 — ANA Consortium circuits  
 — Existing GEANT, AfricaConnect and EuMedConnect3 infrastructure (various speeds)  
 ☆ Other open exchange point  
 Circuits shown represent existing, planned and

# NEAAR isn't just a network

- **Emphasis on science support**
- **Emphasis on understanding network performance**

"If there isn't  
a metric, it  
doesn't exist"



DECISIONS

ewide16

DECISIONS

#statew

DECISIONS

# PerfSONAR

- **Active measurement tool**
  - Bandwidth and latency
  - Dropped packets
- **Over 2,000 R&E deployments world wide**
- **Small node options and deployments**
  - Kenya, Malaysia, partial iLight

# KENET perfSONAR Deployment

- **12 Network Admins and Engineers participated from KENET**
  - **Meoli Kashorda, Kennedy Aseda, Hezron Cheserek, Joan Masai, Judah Opuck, Luke Matere, Maureen Wanja Njue, Michelle Opiyo, Moses Ojiambo, Ronal Osure, and Thomas Misoï (AMPATH) with instructors from NSRC and IN@IU**

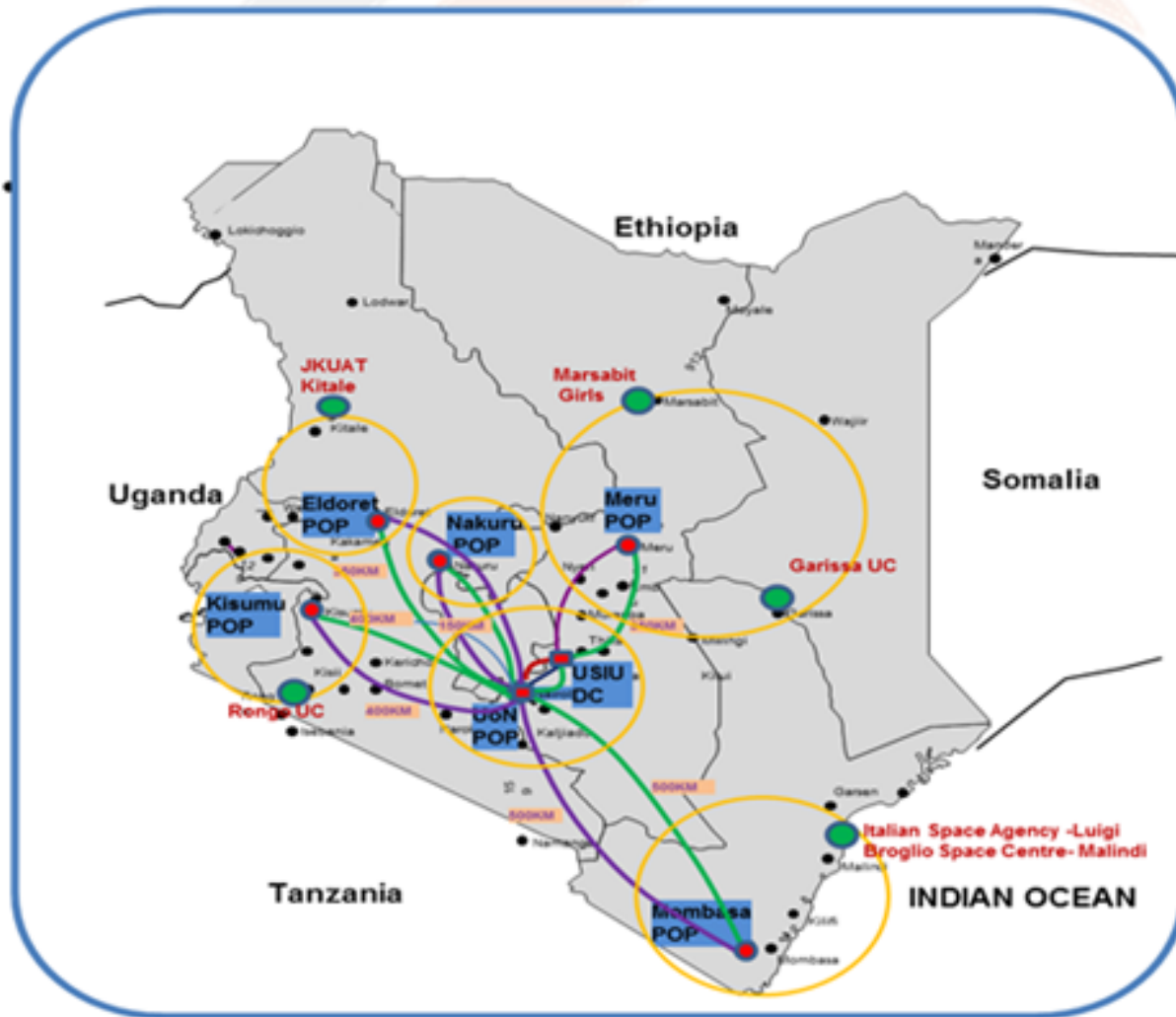


# SuperMicro by Servers Direct

- Price-point: \$600-1000 (all pieces)
- Supported Build: CentOS Toolkit
- Rack-mounted
- 1GE/10GE tested
- Customizable builds



# KENET Network Coverage Map



- Primary fiberlinks
- Backup fiberlinks
- KENET POP
- Furthest connected campus

POP	Number of Campuses Connected
Nairobi POP	83 (2 pS nodes)
Kisumu POP	20
Mombasa POP	13
Eldoret POP	16
Nakuru POP	11
Meru POP	11
<b>Total Campuses connected</b>	<b>152</b>

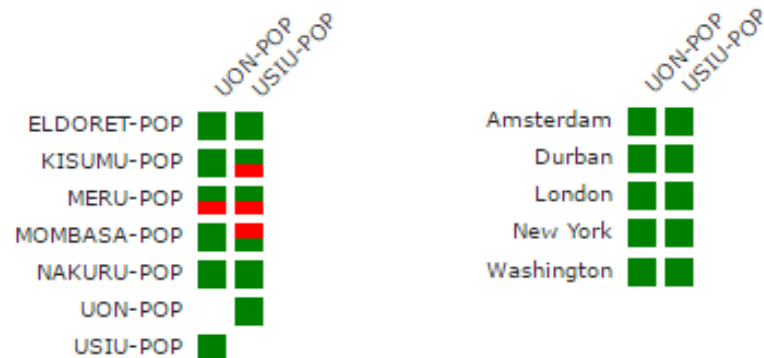


# KENET perfSONAR Deployment

- 7 sites now deployed.
  - One at each KENET POP (indicated on the map as red dots) and a second node in Nairobi at the USIU data center
- Personnel from Network Startup Resource Center (NSRC) and IN@IU assisted with training and resources
- <https://maddash-uon.kenet.or.ke/maddash-webui/>

KENET Mesh Config - Core to Remote OWAMP Testing

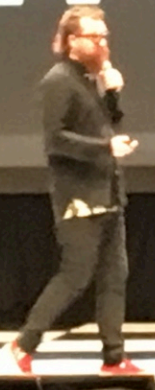
■ Loss rate is  $\leq 0$    ■ Loss rate is  $\geq 0$    ■ Loss rate is  $\geq 0.01$    ■ Unable to retrieve data



# perfSONAR going forward

- **No one correct way to deploy**
- **Different meshes can talk to same test points for different results**
- **More test points will give more information**

"If there isn't  
a metric, it  
doesn't exist"



DECISIONS

ewide16

DECISIONS

#statew

DECISIONS

**If there isn't an  
end user, why  
have a network?**

# Science Engagement

- **Who's using the links?**
- **Who's having problems using the links?**
- **How do we better support science?**

# End-to-End User Engagement

- **Part of every network contract for IN@IU last 5 years**
- **Science engagement workshops**
  - **Cross Connect series with ESNet**
- **One-on-one science engagement**

# Initial letters from:

- **Dr. Jonathan Dick: Academic Model Providing Access to Healthcare (AMPATH)**
  - **Moi University (Kenya) , consortium of North American universities**
- **Dr. Li Huang: BREAD: agriculture, wheat**
  - **US, Australia, China and Kenya**
- **Dr. Aaron Parsons: Hydrogen Epoch of Reionization Array (HERA) (Astronomy)**
  - **US, South Africa**

# Initial Letters cont.

- **Dr. Beth Plale: Adaptive Management on Food Security**
  - Kenya, Zambia, US
- **Dr. Fredrick Semazzi: HydroClimate**
  - Lake Victoria consortium with US institutions
- **Dr. Thomas Sterling: HPC**
  - S. Africa and US Consortium
- **Dr. James Westwood: Plant Genomes**
  - Trans-Africa consortium
  - Evolution of parasitic plants

# Science Engagement

- **As we contact groups, and groups contact us**
  - **How can we put in place process for support?**
  - **How can we enable long term encouragement and aid?**



# NEAAR is more than just a Network

- **Partnerships with Regional RENs are primary importance**
- **Small perfSONAR node deployments, joint with African regional RENs**
- **Science engagement in Africa and Europe**

# Acknowledgements



- **NEAAR is funded by US NSF award #1638863**
- **More information: [jmschopf@iu.edu](mailto:jmschopf@iu.edu)**