



EPOC

Engagement and Performance
Operations Center

EPOC

Roadside Assistance to the Rescue

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ESnet

ENERGY SCIENCES NETWORK



INDIANA UNIVERSITY

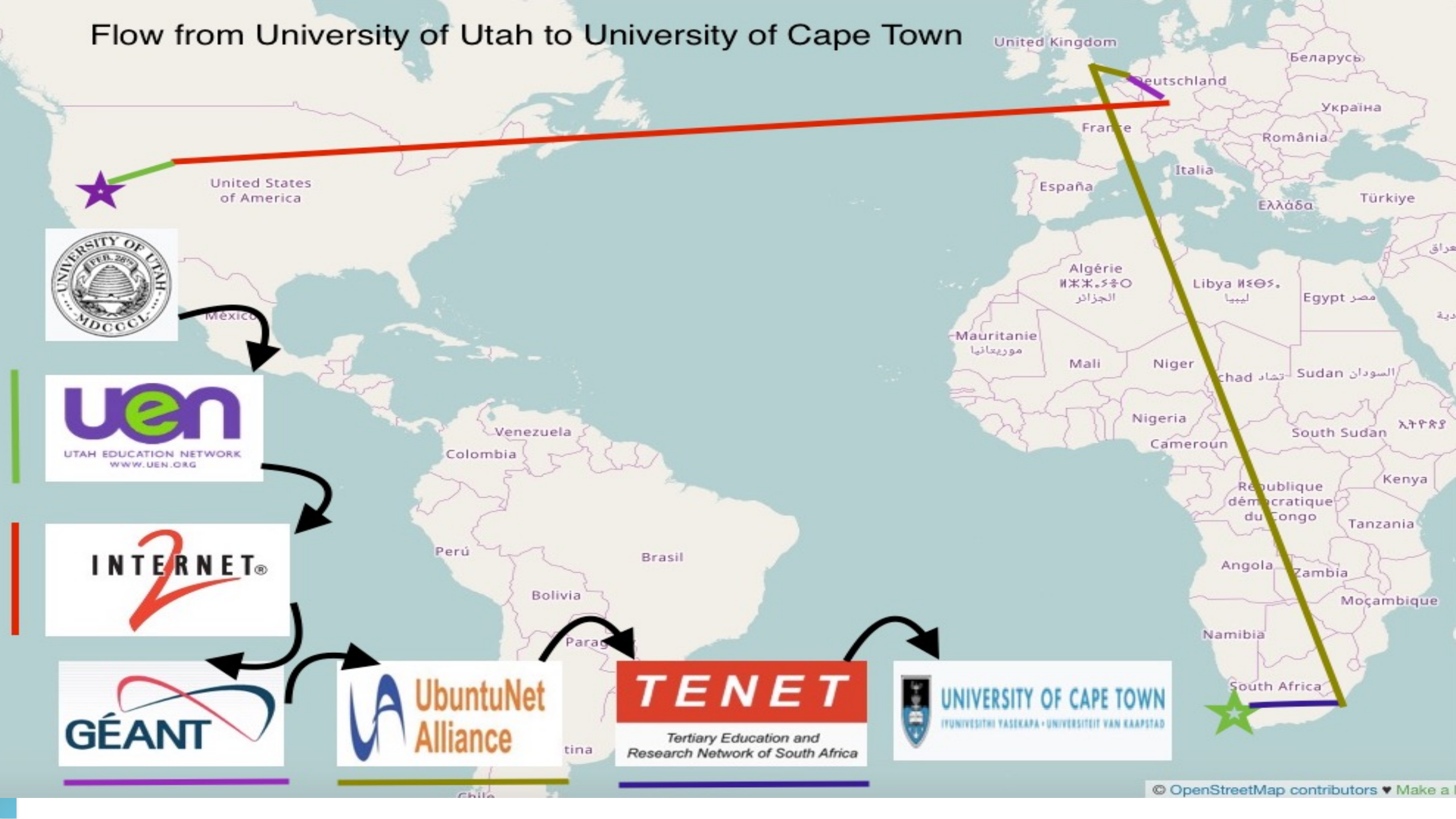
Engagement and Performance Operations Center

- Joint project between Indiana University and ESnet
 - PI: Jennifer Schopf (Indiana University)
 - co-PI Jent (IU GlobalNOC) and Zurawski (ESnet)
- Part of CC* program for domestic science support
 - Program Officer: Kevin Thompson
- Award #1826994, \$3.5M over 3 years
- Partnerships with regional, infrastructure, and science communities that span the NSF and DOE continuum of funding

Understanding End-to-End Performance is Hard

- Lots of pieces - Host system through networks to host system
- No one controls all the pieces
- Unknown expectations for what performance should be
- Soft failures are hard to find
- Many, many points of coordination

Flow from University of Utah to University of Cape Town



EPOC Five Main Focus Areas

- 1. Roadside Assistance for Performance Problems**
2. Application Deep Dives
3. Network Analysis (NetSage)
4. Services “in a box” (DMZ, testpoint in a box, etc)
5. Training

EPOC Roadside Assistance – epoc@iu.edu

- “This file transfer worked last week, but it doesn’t anymore?”
 - Think of this like a flat tire, crash repair
- EPOC is a collaboration of 3 teams already supporting this
 - ESnet Science Engagement (engage@es.net)
 - IN@IU
 - IRNC NOC Performance Engagement Team (PET)



Roadside Assistance Process

- Contact epoc@iu.edu
 - Gets triaged and assigned a case manager, engineer
 - NOC ticket set up, as well as docs that reporter and other orgs have access to
- Problem – scientists often doesn't know status
 - Solution – Updates to google doc in plain language by the case manager, direct contact as requested
- Problem – many orgs involved results in many tickets, which no one has all the info about
 - Solution – Local experts on both sides pulled in early
 - Solution – Folder for all engineering docs shared across orgs

LHC Data Movement Issues between Pakistan and the UK

- High Energy Physics, specifically the Large Hadron Collider, is set up to share data from Tier 1 sites, which are large, regional sites storing all or most of the data, to Tier 2 sites, smaller country-level sites, which in turn share data to local universities and researchers
- National Center for Physics (NCP)
 - Tier 2 LHC site at the Quaid-i-Azam University Campus in Islamabad, Pakistan
 - 1G connection to Pakistan national network (PERN)
- Queen Mary University, London
 - Tier 1 site for region
- Transfer rates NCP-QM as low as 40 Mbps
 - NCP-Australia Tier 1 500 Mbps transfers
 - NCP-ESnet Tier 1 280 Mbps transfers
- Additional intermittent performance problems over previous 2 years

LHC Pakistan-UK Problem Identification (1)

- A traffic shaping misconfiguration on the NCP connection to PERN
 - limited R&E traffic to 50Mbps
 - PERN removed traffic shaping for R&E traffic
- Top of rack switch bottleneck between NCP's file transfer node and edge router
 - Moved file transfer node to the edge router, performance increased from 40Mbps to 100Mbps or better
- Small amounts of ongoing, intermittent packet loss within the campus network
 - Identified by perfSONAR, cause unclear
 - Moving data node closer to the edge of their network to alleviated the issue
 - Work continues to identify source of loss

LHC Pakistan-UK Problem Identification (2)

- Packet loss identified inside the PERN regional network
 - Specific cause of the loss still unclear, work ongoing
- Additional bottlenecks between PERN and TEIN (Asian) networks
 - 1Gbps between national and regional network
 - Congestion is common, therefore so is packet loss
 - Upgrade to 10Gbps being explored
 - Temporary use of commercial path being explored

LHC Pakistan-UK Outcome

- Original Data transfer NCP to Queen Mary: 40 Mbps
- After engagement transfer speed: ~480 Mbps
- Additional areas for performance improvements identified
 - Larger scale and longer term changes to infrastructure needed
 - Discussions ongoing

Take Aways

- EPOC is an NSF-funded operations center to help scale science engagement and problem resolution
- Single point of contact to help with end-to-end performance issues
 - epoc@iu.edu
- More about EPOC:
 - <http://epoc.global>
- Jennifer Schopf, jmschopf@iu.edu
- Jason Zurawski, zurawski@es.net
- Dave Jent, jent@iu.edu

