



U.S. DEPARTMENT OF
ENERGY



ESnet Update

LHCONE Meeting #53 Beijing, China

Outline

- 2024 HEP Requirements review
- Trans-Atlantic update
- Trans-Pacific review
- US Site upgrades



2024 HEP Requirements Review

ESnet Requirements Program Overview

ESnet's core partnership program created to comprehensively evaluate:

- **Major science experiments and facilities**, both in operation and planned.
- **The process of science** used for knowledge discovery, and including scientists' interactions with the instruments and facilities.
- **The volume of data** produced now, and anticipated in the future, with an emphasis on geographical location of where the data must be shared, computed and/or stored.
- **The current technology capabilities** (network, computation, storage, and software stack) used by each science collaboration/facility as well as any planned upgrades, additions or improvements.

2024 HEP Requirements Review Topics

Two types of case studies:

- Sites and facilities
 - Labs: ANL, BNL, FNAL, SLAC
 - HPC: ALCF, NERSC, OLCF
- Science Case Studies
 - Cosmological Simulations
 - Dark Energy Spectroscopic Instrument (DESI)
 - Vera C. Rubin Observatory
 - Dark Energy Science Collaboration (DESC)
 - Muon Experimentation at Fermilab
 - Muon G minus two (g-2)
 - Muon-to-electron-conversion experiment (Mu2e)
- Science Case Studies (cont)
 - Cosmic Microwave Background (CMB)
 - Belle II Experiment
 - Neutrino Experiments at Fermilab
 - SBN
 - DUNE
 - The Large Hadron Collider (LHC)
Topics on:
 - ATLAS Experiment
 - CMS Experiment
 - LHC Operations
 - HL-LHC & Network Research
 - Super Cryogenic Dark Matter Search (Super CDMS)
 - Alpha Magnetic Spectrometer (AMS) Experiment

2024 HEP Requirements Review Outcomes

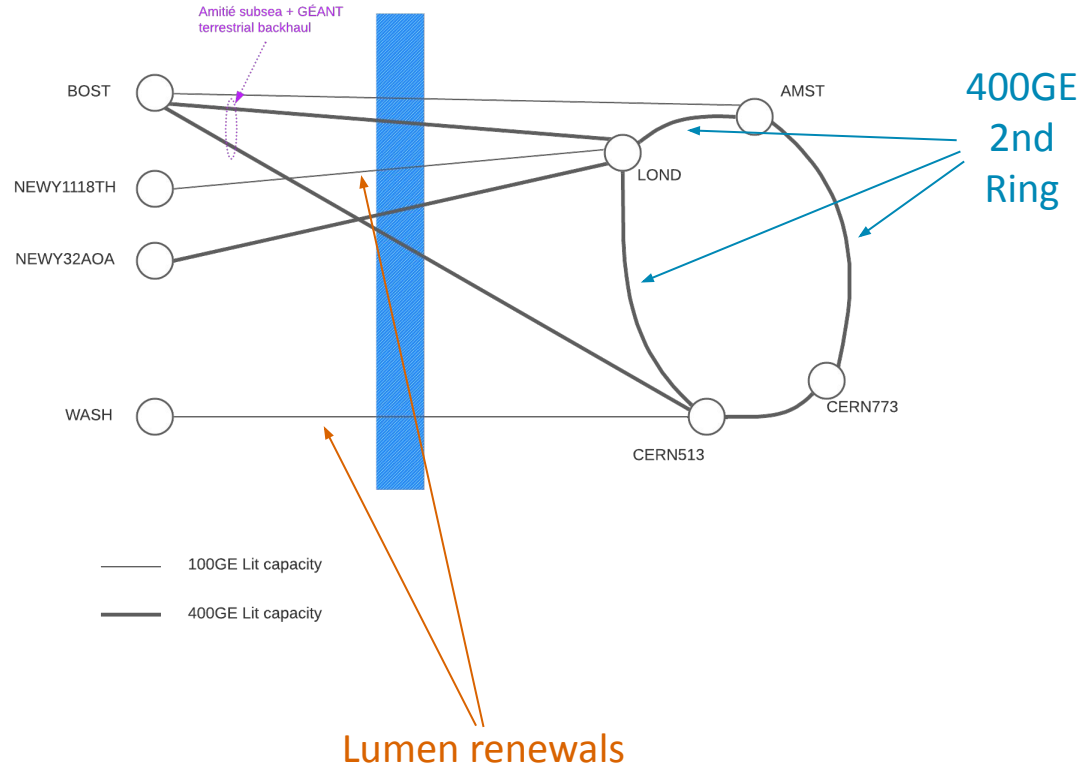
- Excellent discussions
- Lots of cross-project collaboration, especially in astronomy/cosmology
- Increased calls for research collaboration between LHC experiments and ESnet
 - ESnet is enthusiastic about this
 - Evaluating options - staff time, hardware resources, etc.
- Information synthesis ongoing
- Report expected in early 2025



Trans-Atlantic Update

Transatlantic Updates

- AEC-1 Spectrum
- Dunant Spectrum RFP
 - To be released soon
- **Lumen 2x100GE**
 - Term ends 10/2024
 - Difficulty renewing
- **European 2nd 400GE Ring**
 - GÉANT preparing for service delivery





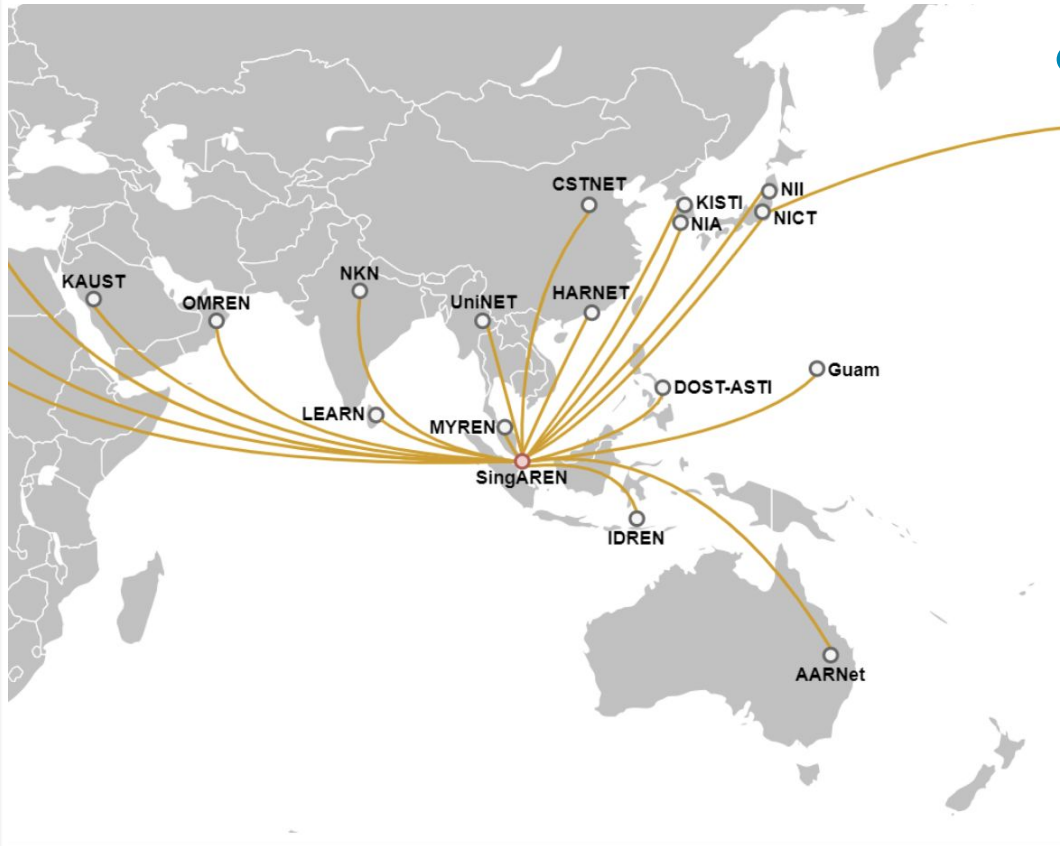
Trans-Pacific Update

ESnet's Connectivity via Pacific Wave

- ESnet routers
 - Seattle and Los Angeles
 - 100G now, 400G soon
- Contact peering@es.net for peering requests
- Open Peering Policy for international R&E networks in this region
 - LHCONE
 - General R&E



ESnet at the SingAREN Open Exchange (SOE)



- ESnet peers with SingAREN via Pacific Wave out of Los Angeles

ESnet's Pacific-facing LHCONE Direct Peers

- ASGC - US-ATLAS T2 site, connection limited to 3Gbit/sec
- CSTNET - ~ 5-10G /sec
- SINET - routinely 30G, recent peaks of 60G
 - *(almost exclusively IPv6)*
- Small amount LHCONE traffic exchanged w/ ESnet
 - AARnet
 - JGN
 - KREONET2



US Site Updates

Current US Tier-1 Status

- BNL
 - 1.6 Tbit/s
 - 800G (2x400GE) primary for LHCOPN + R&E connectivity
 - 800G (2x400GE) primary for LHCONE
- FNAL
 - 2.4 Tbit/s
 - 1.6 Tbit/s (4x400GE) primary for LHCOPN & LHCONE
 - 800G (2x400GE) for R&E connectivity
- *In both cases, traffic can failover between links*

US Tier-2 Status Updates

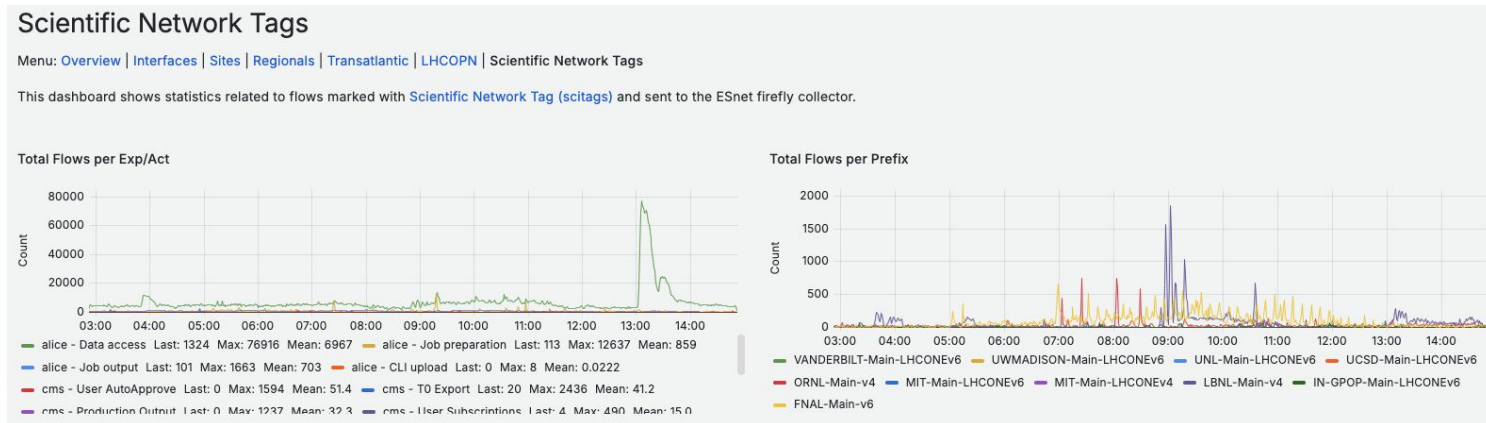
- Typical T2 topology:
 - ESnet LHCONE --> Regional Network --> Campus
- Continuing to prioritize upgrades as sites are ready.
- Recent changes and upcoming connections:
 - 2x400G to GPN for Nebraska and U-Oklahoma (SWT2)
 - 2x400G + 4x100G to BTAA for MWT2, AGLT2, Wisconsin, Purdue
 - 400G for NET2 "any minute now"
 - 400G for MIT in planning

Other ESnet Updates...

Reminder about the LHCONE/LHCOPN dashboard:

<https://dashboard.stardust.es.net/d/IkFCB5Hnk/lhc-data-challenge-overview?orgId=2>

Now showing SCitags:



Thank you!

Feel free to reach out with any questions:

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