ESnet Extension to Europe (EEX)

OSG Meeting, SLAC, April 7 2014
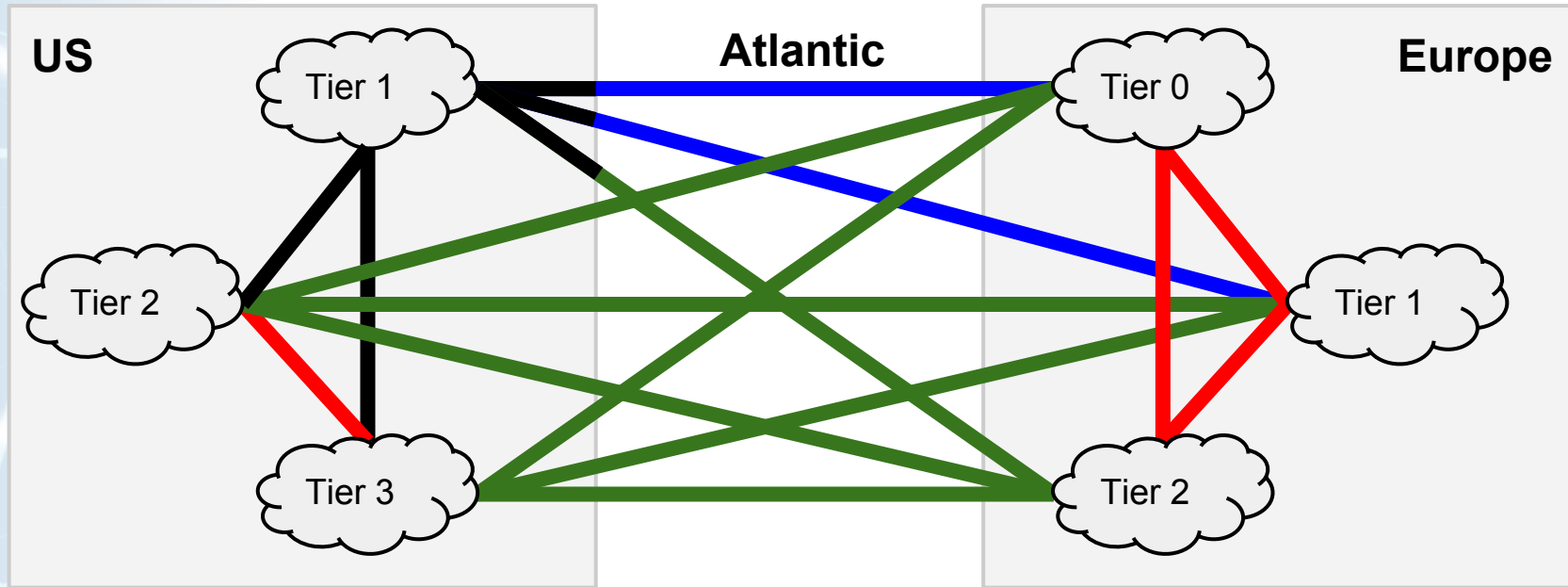
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Disclaimer

Michael Ernst has asked me to describe the additional services that ESnet will be able to provide to the US LHC community **if US LHC management** accepts and approves the ESnet EEX project.

If it is not approved, none of this will happen.

Expanding ESnet Scope to Support US LHC Flows

US   **Atlantic**   **Europe**

BLACK = Historical ESnet Scope
**RED = Out of Scope**

BLUE = In Scope via LHCOPN
GREEN = In Scope via LHCONE

EEX - Expansion of the ESnet network into Europe

- Drivers: Improve the quality and quantity of transit to Europe for:
  - All currently supported ESnet programs
  - **All US LHC science**
- Architecture extends ESnet5
  - Hubs at
    - CERN
    - London
    - Amsterdam
  - Links
    - 100G Ring between European Hubs
    - 3 100G trans-atlantic circuits
    - 1 40G trans-atlantic circuit
    - **No 10G bottlenecks!**
- Timeline
  - US LHC project approval anticipated in mid *April*
  - Goal is completion before end of Fiscal Year (October 1 2014)

EEX Architecture
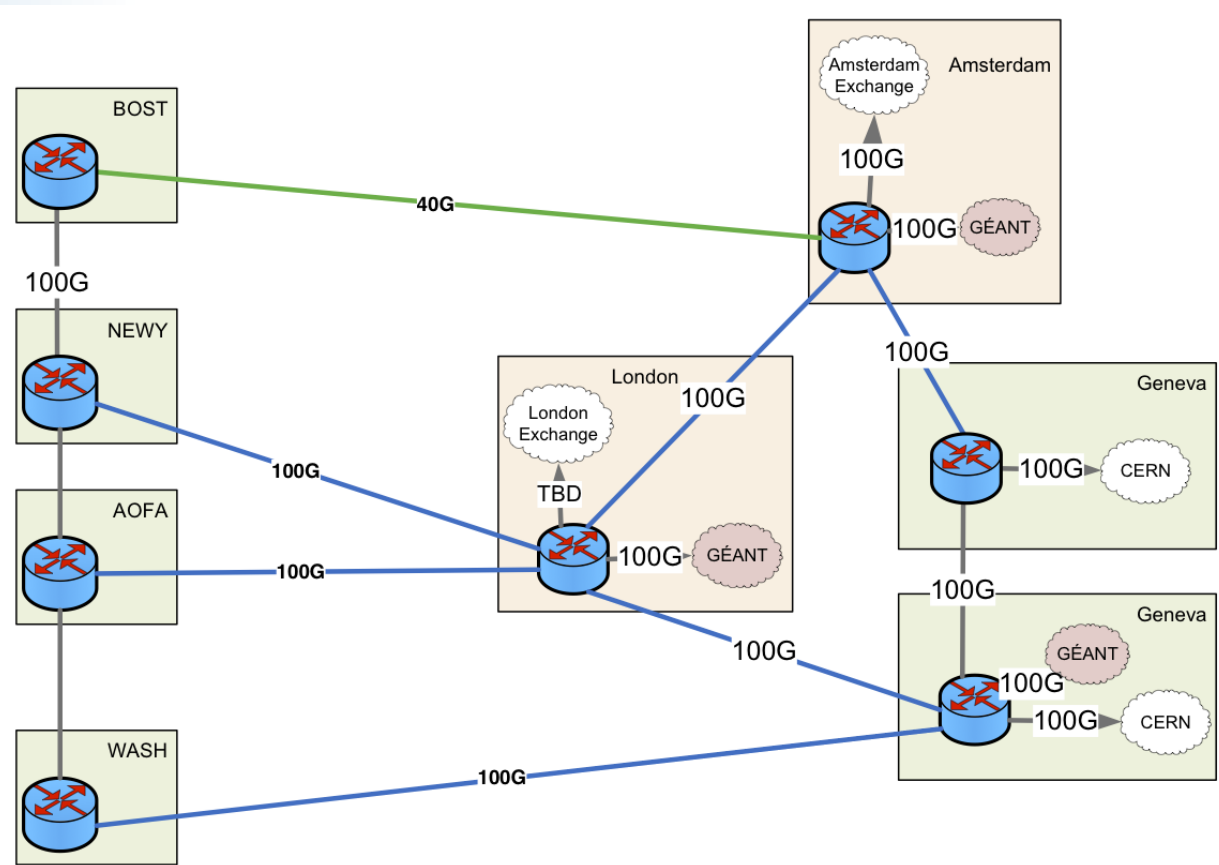
DRAFT EEX Service Levels

The following table summarizes initial proposed service levels under various failure scenarios. Keep in mind that the repair time for submarine cables is measured in weeks, not hours, and we expect to spend significant time with 1 circuit down. Traffic loads will be monitored and redistributed manually as necessary in all failure scenarios.

	All Circuits Up		1 Circuit Down		2 Circuits Down		3 Circuits Down	
Service	**Reserved BW**	**Peak BW**	**Reserved BW**	**Peak BW**	**Reserved BW**	**Peak BW**	**Reserved BW**	**Peak BW**
LHCOPN BNL	40	200	20	100	20	40	10	40
LHCOPN FERMI	40	200	20	100	20	40	10	40
LHCONE	120	200	60	100	50	100	10	40
ESnet IP	100	100	100	100	50	100	10	40
A: 40G BOST-AMS **B: 100G NEWY-LOND** **C: 100G AOFA-LOND** **D: 100G WASH-CERN**	A: Other B: LHCOPN/LHCONE C: ESnet IP D: LHCOPN/LHCONE		Similar of B or D fail A: Other B: Down C: ESnet IP D: LHCOPN/LHCONE		Both B&D Fail A: LHCOPN B: Down C: ESnet IP & LHCONE D: Down		B, C & D Fail A: All Services B: Down C: Down D: Down	

Implementing the Expanded Services - Policy

In consultation with ESnet, US LHC, DOE ASCR & DOE HEP minor adjustments to the existing ESnet policy framework will be developed after the project is approved .

This will include updating or tailoring documentation for the universities that describes the ESnet expanded services, Acceptable Use Policies (AUP), privacy policies, and other implementation policies & procedures as necessary.

Anticipated Framework

- US LHC will appoint 2 "ESnet Site Coordinators".
  - These Site Coordinators will represent the Tier2/Tier3/Universities/US LHC in the ESnet management and governance frameworks.
  - The Site Coordinators or their Designees (US LHC Management) will:
    - Work with ESnet to decide which Tier2s and Tier3s ESnet should support, connection sizes and locations.
    - Approve network change requests related to Tier2 & Tier3 centers
    - Ensure/certify that the Tier2 & Tier3s accept the policies, and the traffic to/from them complies with the policies
    - Provide network operations & security points of contacts for the Tier2 & Tier3 center

Implementing the Expanded Services - Technical

After being approved by the ESnet LHC Site Coordinator:

- The University will need to meet ESnet at an existing ESnet **100G** hub or Exchange
    - The University is responsible for the connection to the ESnet hub.
    - This can be via the universities own network, a regional, Internet2 AL2S, etc.
- ESnet will leverage the **LHCONE VRF** to provide services to the Tier 2s and Tier 3s.
    - ESnet's LHCONE VRF will peer directly with Universities AS
        - ESnet will advertise DOE labs and European prefixes to Universities
        - ESnet will not advertise prefixes from one US University to other US Universities
    - **Universities will have to follow LHCONE VRF best practices**
        - Prefixes announced should be LHC data storage and analysis systems
        - ESnet will not accept /8s or other large blocks containing offices, desktops, wireless, etc.
        - **Universities that can't segregate their resources may not be able to participate**
- The service will be enabled in an orderly fashion one site at a time after EEX is substantially completed (starting late summer or early fall)
- There will be no port fees or other costs to the Universities
    - The financial support is coming from ASCR & the US LHC program directly to ESnet
    - But, we do need to manage expenses; so connections to ESnet will be managed & sized appropriately

LHCONE-VRF Concerns

Most of the World

- **Has been a big success improving T1-T2 connectivity**
- The funding structure, the contractual structure, and the service structure are well understood and congruent.
- The structure for LHCONE-VRF is the same as for most other network services
- Europe Example:
  - End site -> Regional -> NREN -> GEANT

- LHCONE provides a 'management handle' for the LHC services that can be used across organizations.
- Additional funds are applied to the managed instance in places where the default service did not provide the baseline service guarantees desired by the LHC users.

Currently in the US

- The contractual structure, the funding structure, and the service structure are all different, and mostly not understood by the end users.
- NSF is providing most of the US funding for the TA capacity via ACE grants to IU.
- LHC is an allowable use of the NSF capacity. LHC is not a prioritized or guaranteed use.
- The universities have contracts with both Internet2 and a regional. Most users have a poor understanding of what is covered under each.
- The universities are getting a point-to-point service from the regionals, and a network service from Internet2 with global reach provided by IU/NSF.
- With EEX, ESnet will remove several administrative boundaries greatly simplifying the service structure, and participants will receive the standard ESnet end-to-end support. We will collaborate closely with you to make sure it works!