Strawman LHCONE
Point to Point Experiment Plan

LHCONE meeting

Paris, June 17-18, 2013

This Strawman

- This strawman is not so much intended to be the experiment plan, but rather a framework for developing the plan, though some suggestions are included

Objectives

- Determine the readiness of NSI implementations to serve in production environments

- Fine-tune the user interface

- Determine if virtual circuits can contribute to "fixing" the site WAN-LAN problem:
  - by providing a direct connection to a (presumably) trusted collaborator
  - by drawing attention to the fact that there is a problem at the boundary
  - etc.

- Engage in an interaction of mutual education with the sites

- Demonstrate a robust and workable multi-domain circuit setup capability

- Define and adapt/integrate/deploy the science applications (CMS PhEDEx, ATLAS PANDA) with circuit services.

Approach

- Phase I: WAN – WAN
  - Implement and test the circuit service within the WAN and (maybe) aggregator environment

- Phase II: Site boundary–Regional–WAN–Regional–Site boundary
  - Terminate the circuits at the site boundary
  - Both ATLAS and CMS expressed interest in being part of the initial proof-of-concept demo

- Phase III: End-to-End circuits
  - Use circuits to connect systems / clusters at one site directly to systems / clusters at another site

- Phase IV: Full mesh of circuits
  - Build a full mesh of static circuits whose bandwidth can be set by the site
  - Need to be careful here that the approach will scale

Phase I: WAN – WAN

- Objective
  - Verify basic circuit functionality in the WANs, ~~aggregators~~ regionals, and exchange points
- Test plan
  - TBD
- Milestones
  1. Draw up a test plan for the R&E domains to verify interoperating NSI implementations
  2. Produce a test suite that WAN, regionals, and exchange operators can use to verify their NSI implementations
     - Step one: Define the functionality needed for the service to be useful,
  3. Identify systems within the domains of the WAN providers that can be used for testing.
  4. Conduct cross-domain circuit setup testing in the WAN provider environment.
     - Agree on and document success criteria

Phase II:
Site boundary – Regional – WAN – Regional – Site boundary

- Objective
  - Use circuits to connect site infrastructure by circuits, but do not assume that automated circuit setup will extend into the site

- Test plan
  - Identify a set of sites and intervening networks that are willing and capable of implementing the P2P service.
  - Bandwidth used could be a portion of the bandwidth used for VRF infrastructure today
  - What to do with the circuit?
    - Connect to a statically defined site VLAN that could be used to connect an end system
    - Connect to a statically defined site VLAN that connects to an internal router interface that could then rout some of the hosts using the current VRF over the circuit
      - Routing issues vis a vis LHCONE VRFs?

Phase II: Site boundary – … – Site boundary

- Milestones
  1. Michael Ernst and Tony Wildish will liaise with the Experiments to expose the idea and solicit site participation, as well as on integration of an appropriate interface to the applications.
  2. Document for the site LAN engineers what is required to provide this capability both on the external and internal facing site border router interfaces.
  3. Determine a baseline of performance prior to implementing the circuit service experiment and prior to sites preparing for the experiment.
     - This may already exist in the LHC analysis systems performance stats.
  4. Define experiments and metrics that will demonstrate the capability – ideally between a number of diverse sites – Tier 2, Tier 3, and geographically remote (on different continents)

Phase III: End-toEnd circuits

- Objective

  - Demonstrate circuits that connect end systems within sites that have a virtual circuit infrastructure and inter-domain circuit set-up capability

  - Determine the right level of API abstraction

  - Try and address concerns that circuits are complex to deploy and debug

- Test plan

  - For API determination, continue joint application and networking experts meeting at CERN

    - ALICE especially is interested in doing clever optimizations with information from the network and co-scheduling resources.

Phase III: End-toEnd circuits

- Milestones

  1. Solicit experience from the entities that already have experience in using circuit service capability

     - ANSE, DYNES, ESnet, Internet2, GEANT, NRENs, etc.

  2. Document for the site LAN engineers and the LHC resource administrators what is required to provide this capability in the interior of the site and at the end systems

  3. Deploy and verify site hardware, software, and engineering capability

  4. Define experiments and metrics that will demonstrate the capability – ideally between a number of diverse sites – Tier 2, Tier 3, and geographically remote (on different continents)

     - This might be done with the existing LHC analysis systems performance monitors.

Phase IV: Full mesh of circuits

- Objective
  - Build a full mesh of static circuits whose bandwidth can be increased/decreased based on application/workflow needs.

- Test plan
  - TBD

- Milestones
  - Develop the test plan.

Resources required

- Sites with sufficient WAN network capacity that meaningful VC experiments can be done

  - (given that VCs will reduce the available capacity for best-effort traffic or what ever else the physical circuit is used for)

- Sites with hardware and engineering resources sufficient to deploy an NSI domain and willingness to devote the engineering effort needed to set up and conduct experiments

- HEP workflow software environments willing to integrate an API that will enable them to communicate their bandwidth requirements to the network, so the bandwidth of the circuits can be determined

Evaluation and Results

- Were the Objectives achieved in a way that is seen as a net gain?