

Report on Ottawa Lightpath Workshop

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What is a Lightpath?

- A point-to-point channel which a NIC sees (or experiences) as a dedicated line with a given Service Level Guarantee (deterministic behaviour)
- Using:
 - WDM?
 - TDM?
 - MPLS based techniques (L2-VPN or similar proprietary ones like CCC and ATOM)?
 - Premium IP?
 - any (technically possible) concatenation of the above?
- No real agreement on common definition so far...





Need for a Workshop

- Worldwide R&E Networking community increasingly pre-occupied with "lightpath" provisioning:
 - Light Exchanges (StarLight, NetherLight, CzechLight, etc...)
 - CA*Net 4
 - Other EU-NREN work
 - SURFnet6
 - Internet2 HOPI Project
 - GN2 JRA3 and SA3
- Need for a workshop identified during CANARIE/ Internet2/GEANT collaboration meeting in Dec 2003
- Workshop held in Ottawa, Canada, March 25-26





Workshop Agenda

- Dissection of transatlantic lightpath experiment
- CA/I2/EU designs and wish lists + discussion
- SURFnet6 preview
- Lightpath definition discussion
- Control plane strategies + discussion
- UCLP software implementations
- Live Demo (Ireland-Taiwan see Victor next)
- Performance measurements
- Control plane inter-op discussion





Trans-Atlantic Lightpath Experiment

- Set up a basic 1G Lightpath as quickly as possible
 - Following KIDS, not KISS that is, keep it difficult stupid!
 - Using a variety of layer 1, 2, and 3 technologies
 - Crossing administrative domains using different layers
- Goal examine the problems, and how one might make this dynamic (in some way)!
- Control Plane
 - 8 hours of conference calls
 - Approximately 300 pieces of e-mail



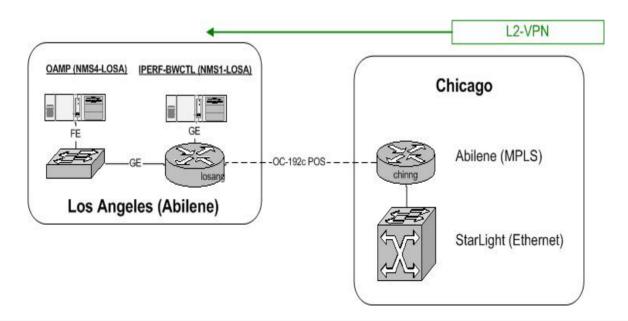
Joint Demo L2 Final Solution

Path legend Path 1 - routed path using Chicago-CERN direct connection (default) Path 2 - routed using GEANT-Internet2 MAN-LAN connection Path 3 - deterministic path using CANARIE/GEANT/Internet2 lightpath L2-VPN OAMP (NMS4-LOSA) | IPERF-BWCTL (NMS1-LOSA) Path 1 - 198.32.10.244 Path 1 - 198.32.8.182 Path 2 - TBD Path 2 - TBD Chicago Path 3 - TBD Path 3 - TBD Abilene (MPLS) -OC-192c POSchinng Los Angeles (abilene ucaid.edu) StarLight (Ethernet) GbE slot/port 15/1 STS-24c within OC-192 CA*net (TDM) 15454 15454 CA*net (TDM) Thru ons-tor01 (ons-nyc01) (ons-chi01) New York OQ-192 slot 5, STS-24c starting at STS-1 -TYCO/IEEAF-Internet2 (TDM) 15454 Surfnet OC-192LR SurfNet (TDM) 15454 (tdm1.amsterdam STS-24c within OC-192 IP VLAN2: TBD VLAN-ID: 238 15454 SurfNet (TDM) (tdm1.amsterdam) IP VLAN1: TBD VLAN-ID: TBD GbE slot/port 14/1 GE GEANT (DiffServ -CERN (datatag.org) Premium IP Service) nl1.nl OAMP (v09gva) IPERF-BWCTL (w05gva) Path 1 - 192.91.239.9 Path 1 - 198.91.239.5 Path 2 - 192.91.238.39 Path 2 - 192.91.238.35 **GEANT** Path 3 - TBD layer 3 Input filter to tag routing packets as PIP (src and dst prefix list) -GE normally PIP packets -STM-16entering GEANT are R04gva retagged as BE Cisco 7606 PIP



LA to Chicago

- MPLS L2VPN across Abilene with preference through the lightpath
 - Setup of VLANs, MTUs, IP addressing
 - Testing of MPLS QoS in the lab

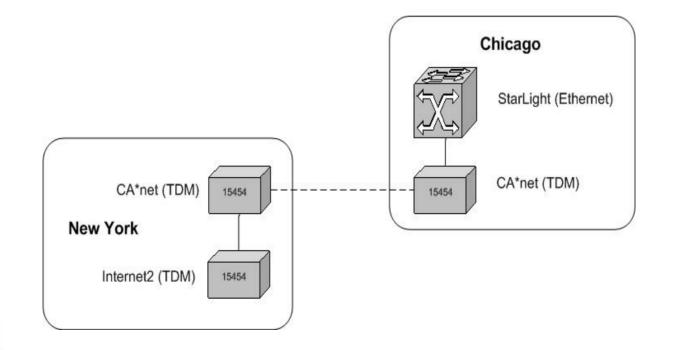






Chicago to NY

- Layer-1 TDM path across CA*Net 4
 - No layer-2, layer-3 configuration needed

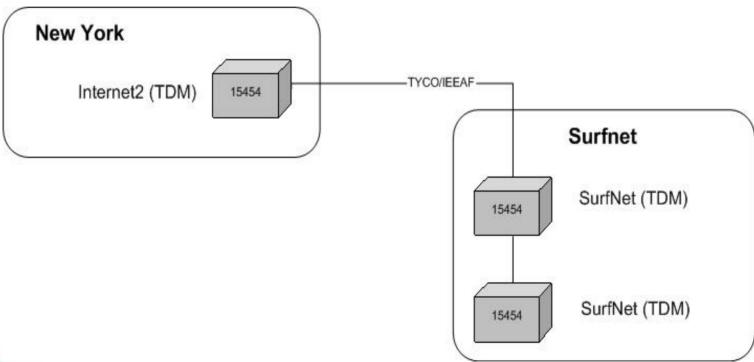






NY to Amsterdam

- Layer-1 TDM path across CANARIE, Internet2, and SURFnet
 - Layer-1 configuration problems encountered on TYCO/IEEAF circuit

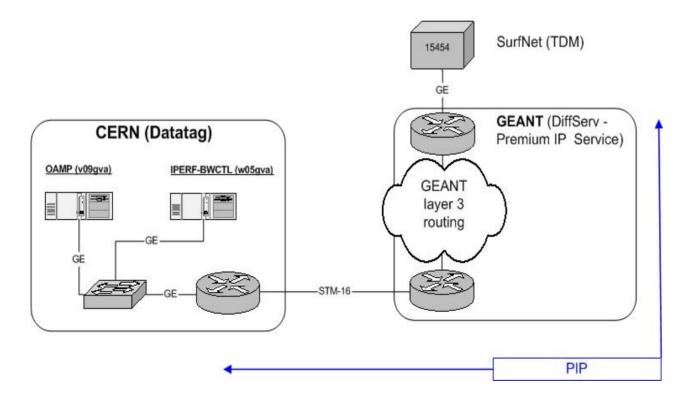






Amsterdam to CERN

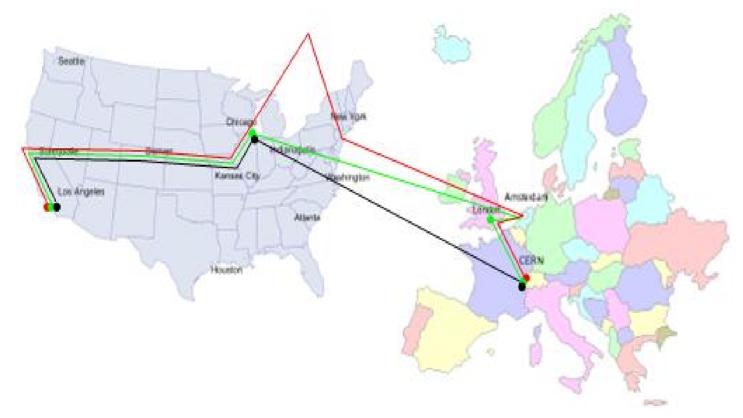
- Layer3 Premium IP Service across GEANT
 - Setup of VLANs, IP addressing, DSCP marking, routing







Measurements



Path 1 — DataTag — Default Route

Path 2 — Eurolink — "Cooked" Alternate Route

Path 3 — Lightpath — "Cooked" Alternate Route

Circles Correspond to OWAMP / BWCTL Measurement Node Pair



Summary

- Biggest hinderance was problems with TYCO circuit
- Performance measurements inconclusive
- Much more work to do on this particular lightpath experiment
- 2nd workshop later this year
- Multi-domain, heterogeneous Lightpaths not yet available "on-demand"...





URL

http://www.canarie.ca/canet4/library/lightpath_workshop/agenda.html





Questions?

