

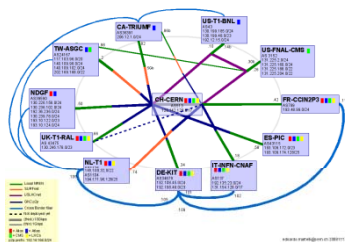


GridPP

UK Computing for Particle Physics

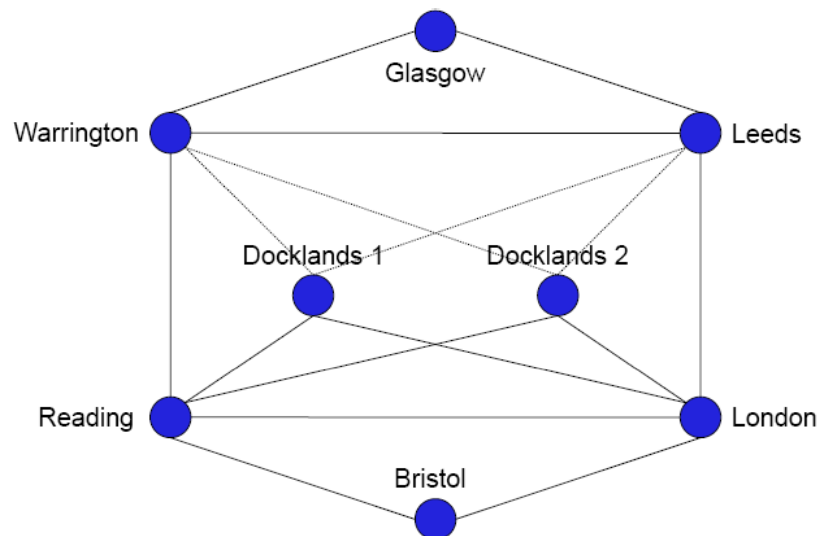
Network Resilience: JANET and the LHCOPN

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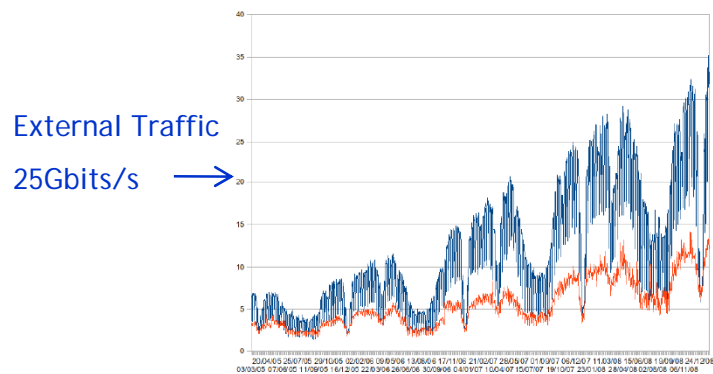
- JANET network updates
- JANET Lightpath news
- LHCOPN - Overview, Status and Resilience

Upgrading to STM-256 (aka 40Gbits/s)

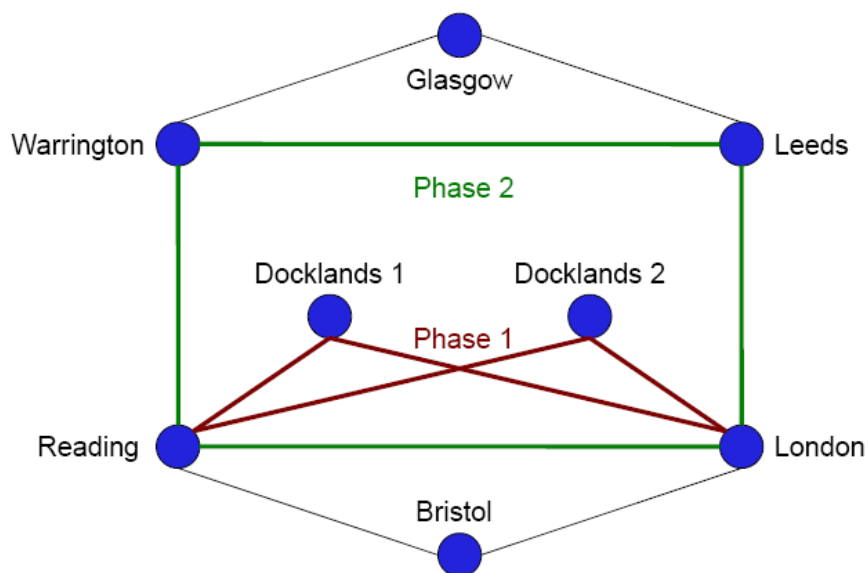


Configuration and Traffic in Summer 2008

- Dedicated optical equipment
 - Ciena CoreStream Regional
 - Ciena CN4200
- Dedicated fibre
- Optical layer managed by Verizon Business
- Most circuits are SDH
 - alarms, diagnostics and error counters provided by SDH
- Juniper T series routers
 - and some Cisco routers...
- IP layer managed in-house by JANET(UK)



Upgraded to STM-256 (aka 40Gbits/s)



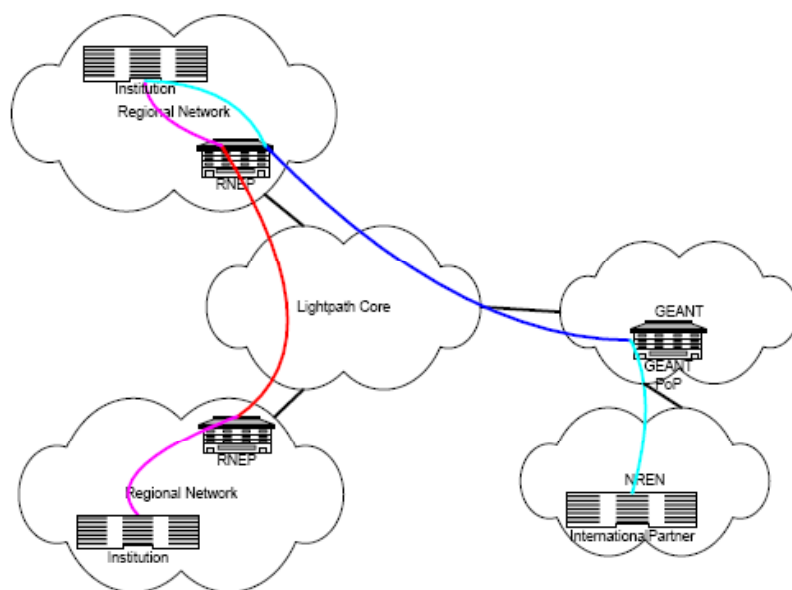
Why choose STM-256?

- Simplicity
 - Prefer one link to multiple
- Some science applications generate large flows!!
 - May overload a particular link in a bundle
- Don't want to squander wavelengths
 - may be needed for "lightpath" circuits

Technical Stuff

- Initially with Juniper T-640s
 - Eight chassis slots
 - 40Gbit/s per slot
- Some routers would have four STM-256 circuits
 - i.e. half the chassis just for core links
- Upgrade to T-1600s!

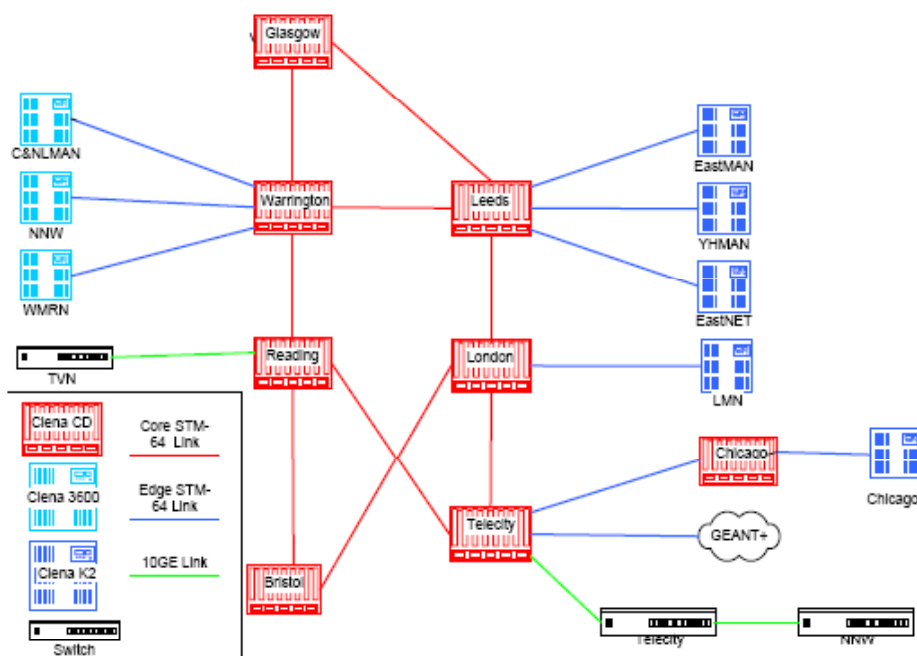
Re-engineering the JANET Lightpath Service



What's Meant by a Lightpath

- Between JANET institutions or to an International Partner
- Three Components
 - JANET Institution to SJ5 Regional Network Entry Point (RNEP)
 - SJ5 Core
 - SJ5 RNEP to JANET Institution or International Gateway to an International Partner

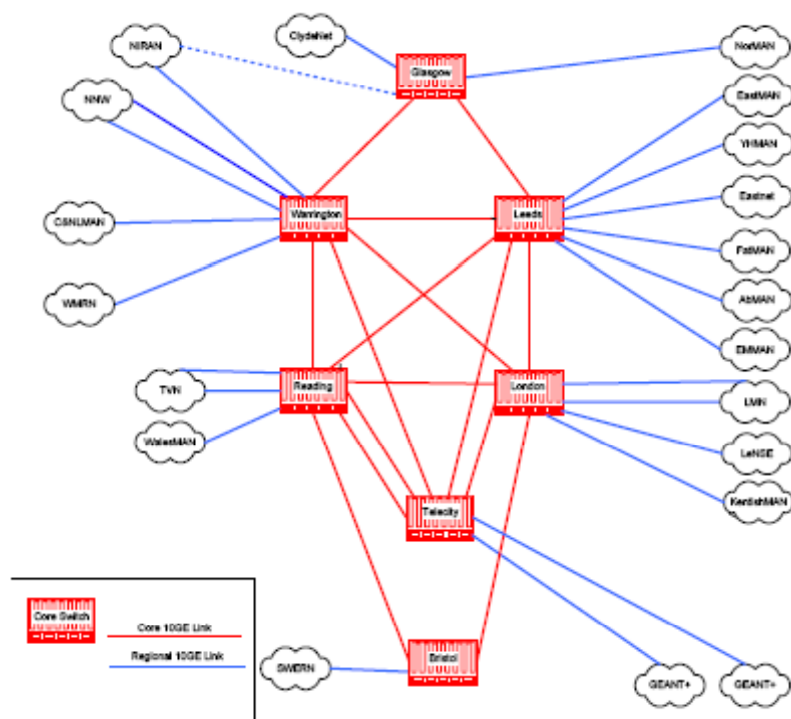
Re-engineering the JANET Lightpath Service



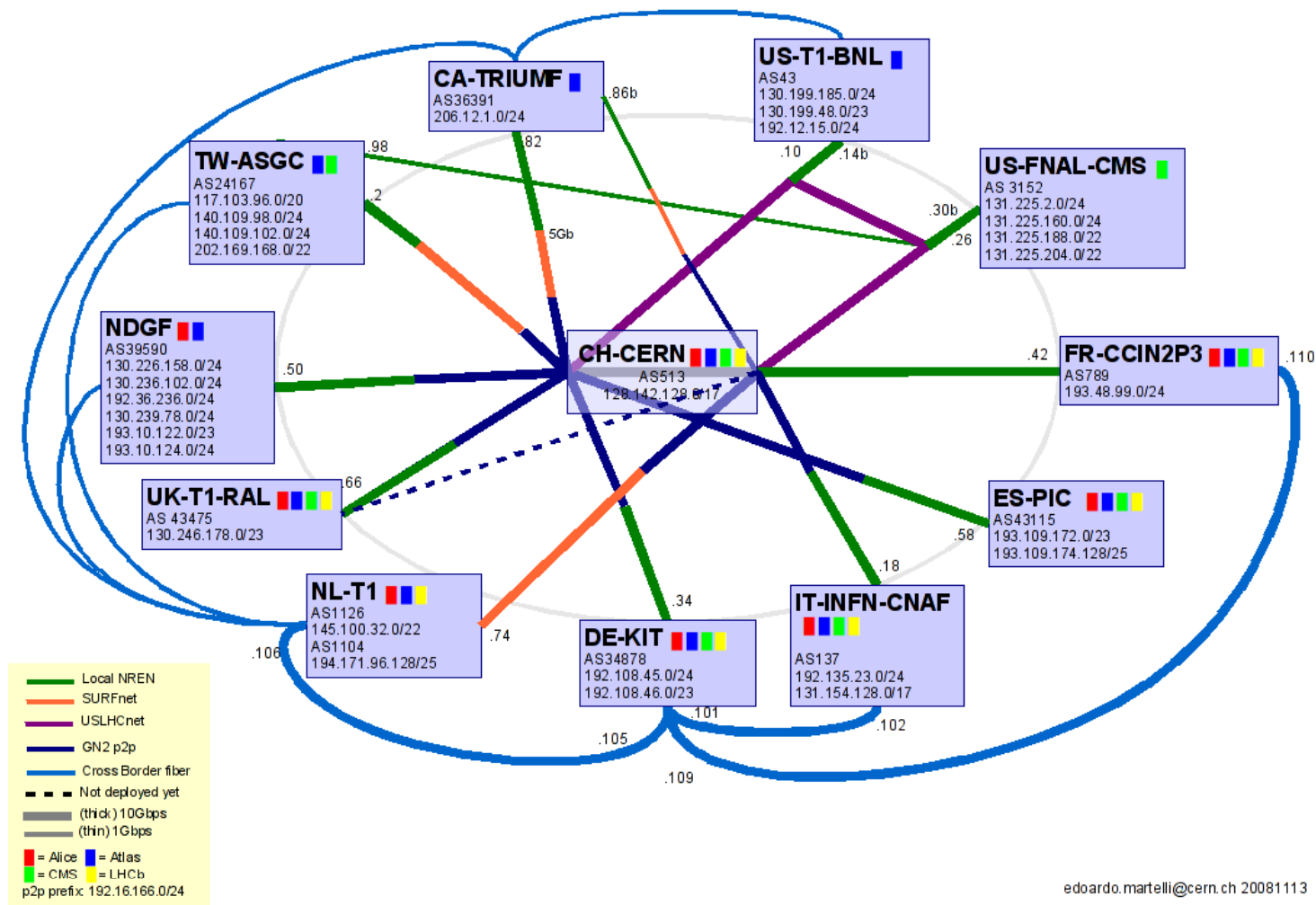
Original Lightpath Core Infrastructure

- 10Gbps SDH
- Equipment at RNEPs 1GE/STM-16 interfaces
- High cost
 - Complex provisioning
 - Separate management system
- Lightpath usage statistics not easily available
 - No lightpath requirement for SDH circuits
- Coming up to 5 years old
- Some regional equipment end-of-life

Re-engineered JANET Lightpath Service



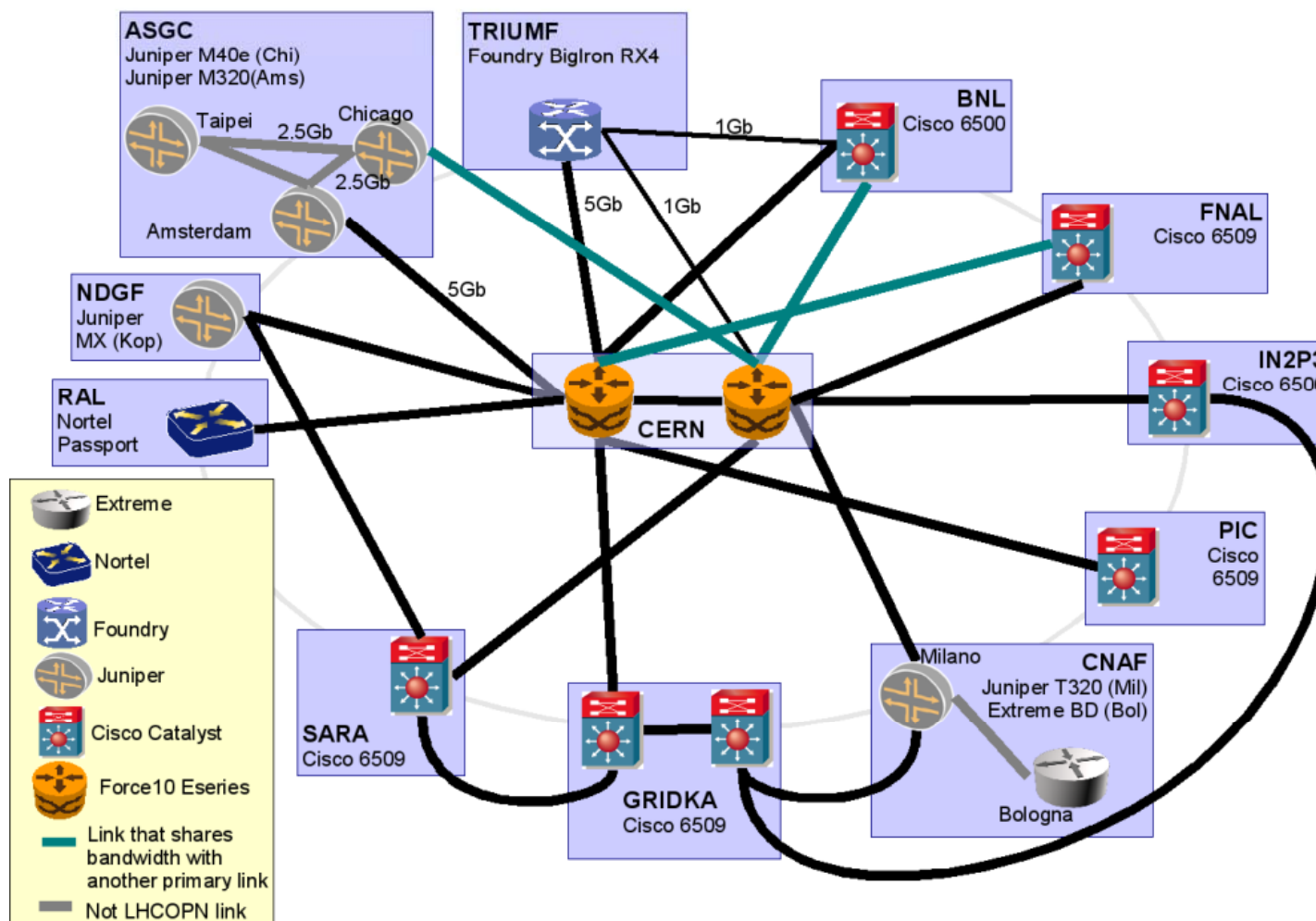
- Retain existing circuits & ring topology
 - Support connection to RN nominated RNEP
 - Equipment at all SJ5 Core Pops
 - Integrate with RN provisioning technologies
 - 10GE circuit to RNEP
 - RNO to provide equipment at RNEP
 - Lightpaths identified by VLANs
-
- Ethernet over MPLS with Traffic Engineering extensions
 - Standard RFC4448 and RFC 3209
 - Implemented in Cisco & Juniper
 - Transparent to customer traffic
 - Path can be explicitly specified
 - Can be integrated with RNs using BGP
 - Resilient paths can be configured

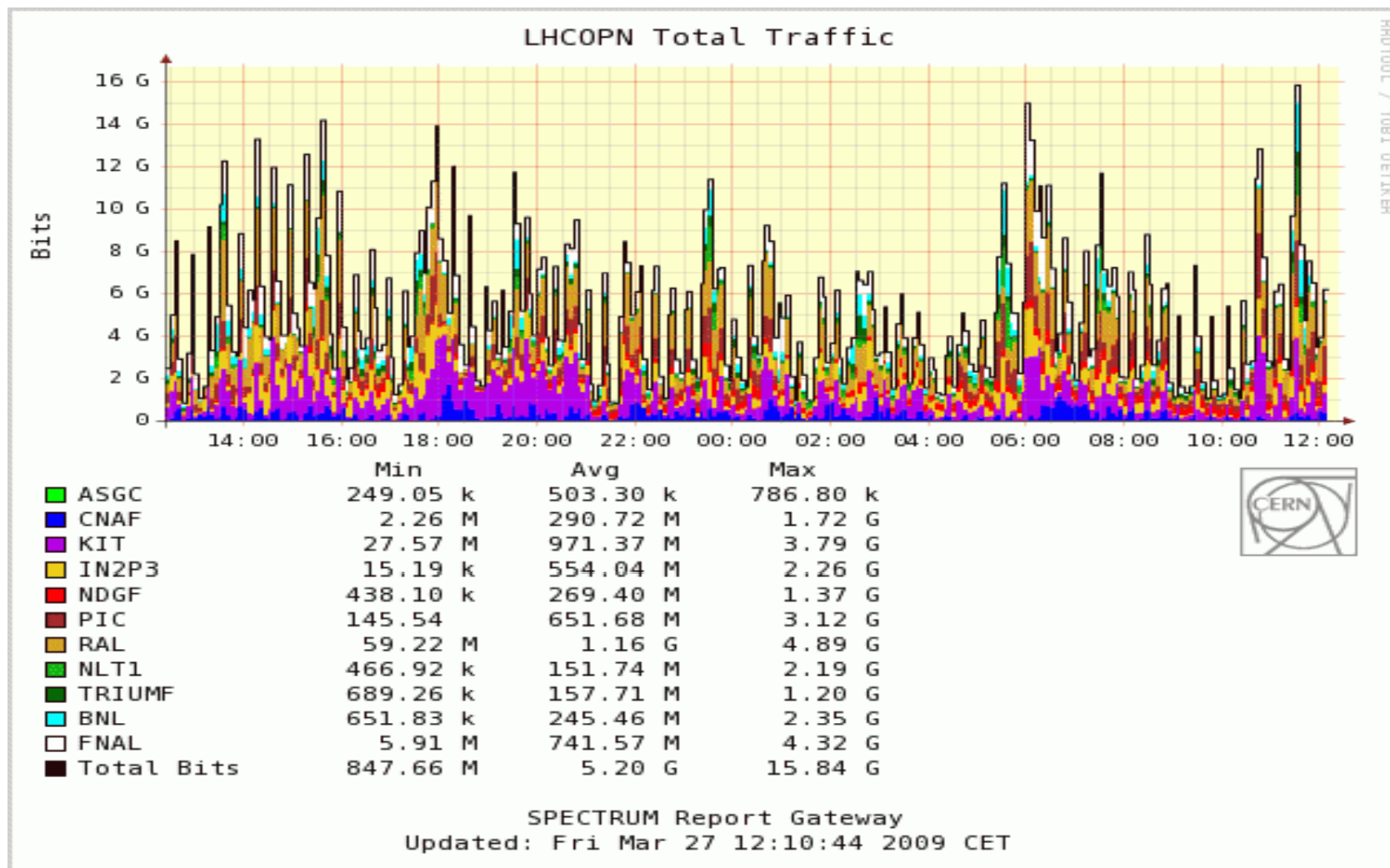


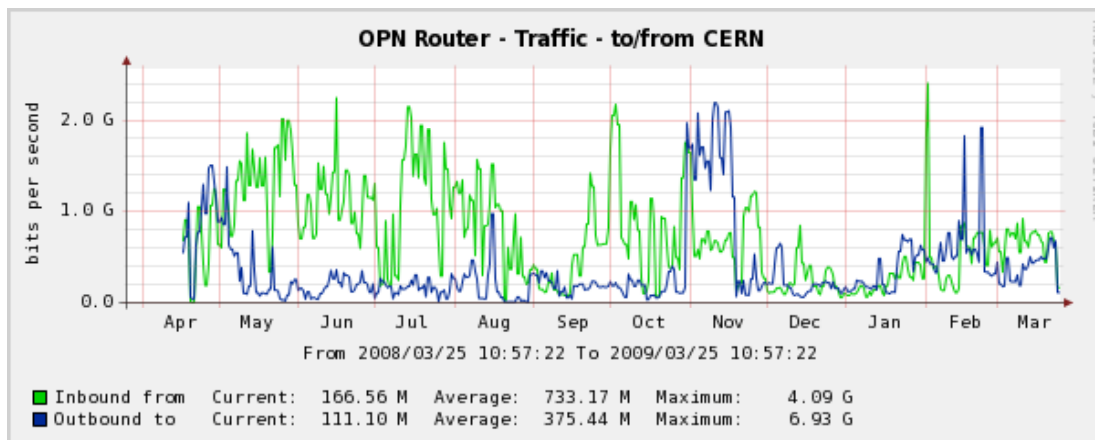
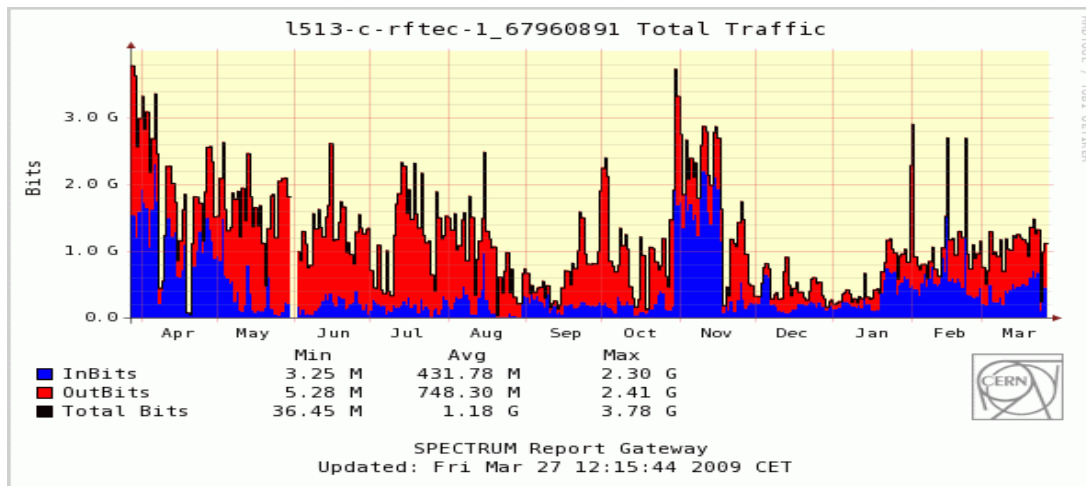
edoardo.martelli@cern.ch 20081113



LHCOPN Construction



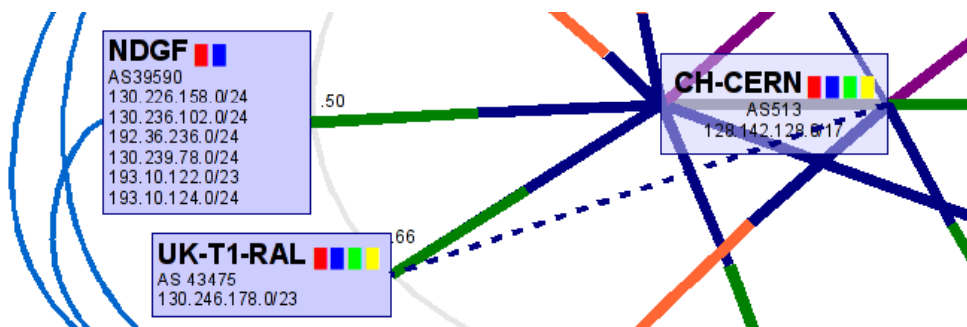




<https://twiki.cern.ch/twiki/bin/view/LHCOPN/WebHome>

- Proposed LHCOPN operational model
 - Conventions
 - Processes
 - Global Problem management processes
 - Incident management process
 - L3 incident management process
 - L2 incident management process
 - Escalated incident management process
 - Change management process
 - L3 change management process
 - L2 change management process
 - Maintenance management process
 - L3 maintenance management process
 - L2 maintenance management process
 - Handling Multi Hop troubles
 - Responsibilities
 - LHCOPN Operational Working group
 - Contact

4Gbits/s Resilience: UK Tier 1 Centre to CERN



Using the new JANET Lightpath Infrastructure

Existing 10G Lightpath

- Re-engineered across TVN
 - RAL to the TVN RNEP at Reading(Neos)
- Reading(Neos) to Teleticity
- Teleticity via Geant to CERN via France

Proposed 4G Backup Lightpath

RAL via TVN to Reading(Verizon)

Reading(Verizon) to Teleticity

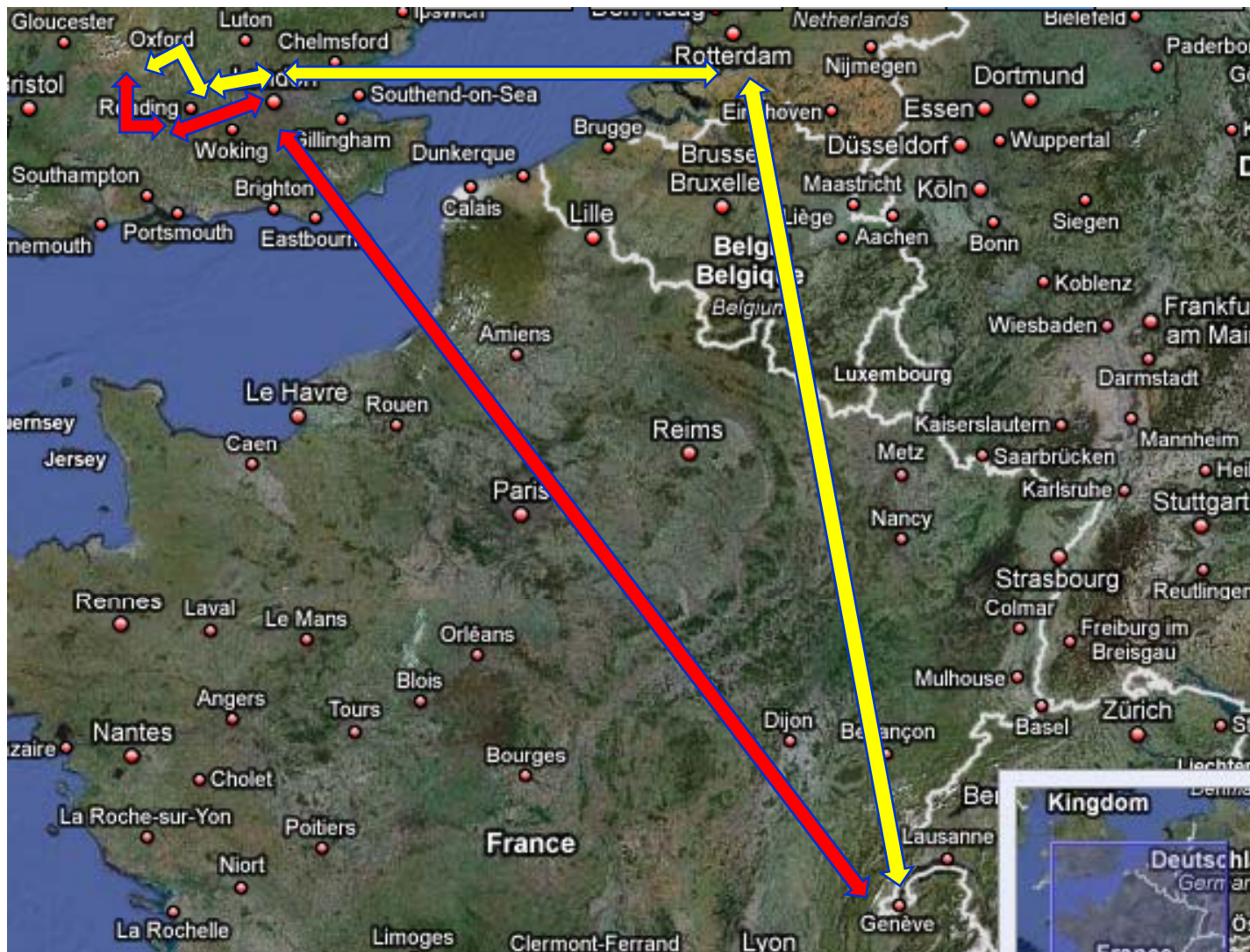
Teleticity via Geant to CERN via northern route

Used in the event of failure on the primary circuit for the traffic between RAL and CERN

All inter-Tier 1 LHC traffic would by default (and design) be dropped for the duration of the outage



LHCOPN Diverse Routes



Questions?