SC04 Workshop

Mumbai

February 2006

David Foster

Network and Communications Systems Group Leader

Information Technology Department

CERN – European Organization for Nuclear Research

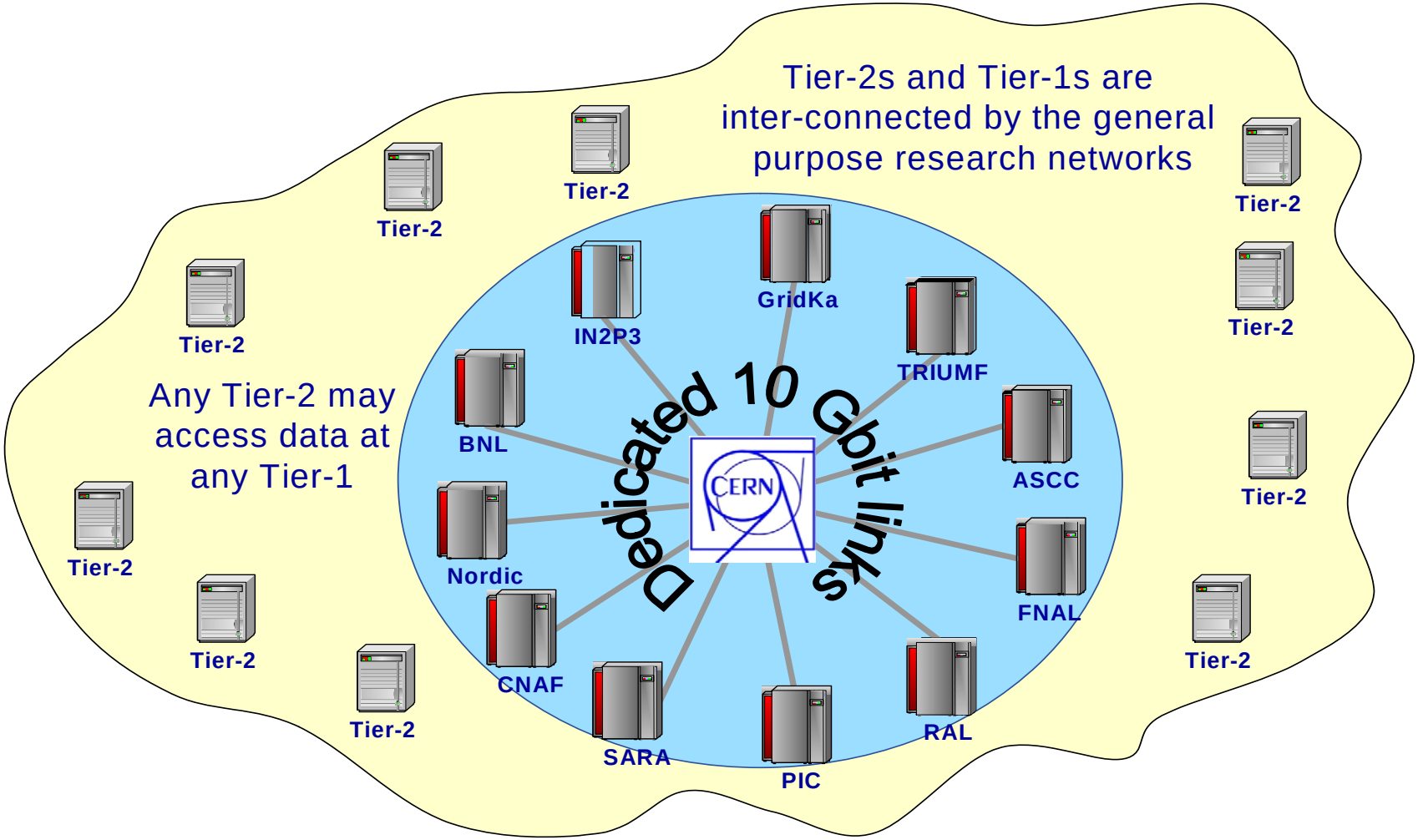
Geneva, Switzerland

david.foster@cern.ch

LHC Networking – T0, T1, T2

- Composed of many different Infrastructures
  - Relies on many different networks
    - Dedicated Circuits
      - USLHCNet (dedicated links)
    - Research Infrastructures
      - National Research Networks (NRENS), Projects (GEANT)
    - Internet connectivity
- Has different requirements
  - Raw data transmission, production, analysis
- Some objectives very clear
  - To be able to get the data from the T0 to the T1's as quickly and reliably as possible after data taking
    - Imagine an "optical private network", OPN, for this purpose, although this is part of the overall networking that will be used.

Tier0 / Tier1 / Tier2 Networks



LHCOPN - Where are we?

- "Complete"
  - SARA - 10G provided by Surfnet but transition to GEANT expected.
  - IN2P3 - 10G provided by RENATER owned dark fiber.
  - CNAF - 10G connected via GEANT
  - FNAL - 10G link available but will share with other US transit traffic.
- Coming soon
  - FzK - Currently GEANT IP service. 10G dedicated will be provided by GEANT.
  - BNL - Currently 10G transatlantic link in place, 10G "last mile" via ESNET expected soon.
- Mid-Year
  - RAL - Currently 2x1G. Will go to 4x1G. SuperJanet4 should complete UKERNA 10G link to RAL and then via GEANT to CERN.
  - NDGF - Currently GEANT IP service. Copenhagen 10G link via GEANT will be transited to distributed T1 by Nordunet.
  - TRIUMF - Currently 10G to amsterdam in place, transited via SURFNET to CERN. Will pass to GEANT transit from Amsterdam.
- End-Year
  - PIC - Currently 1G shared, will become 1G dedicated. 10G via GEANT (maybe via drop off of Madrid dark fiber in Barcelona)
- Unclear
  - ASCC - Currently 2x1G. Plans to go to 2x2.5G

Risks, Open Issues and Problems

- The cost sharing agreement with the GEANT partners (NRENS) are not yet complete.
  - Expect the formalities to be complete in the next 4 weeks, but negotiations are on-going and difficult.
- Some links will increase bandwidth as needed.
  - USLHCNet links will pass other traffic.
  - ASCC will not have full 10G bandwidth.
  - TRIUMF will increase bandwidth as needed.
- LHC OPN working groups status
  - **Routing** – all is largely clear.
  - **Security** – all is largely clear, some work now needed for this to be ratified by the site security officers.
  - **Monitoring** – not yet clear. Options exist, but dedicated infrastructure likely.
  - **Operations** – not yet clear. Interoperation of GRID/network operations very unclear. The role of EGEE NOC (ENOC), the NREN NOCS, DANTE, GGUS etc. Processes as yet undefined but work is on-going in this area.
- Many network operations not 24x7
  - http://lhcopn.cern.ch