Abstract

The poster presents the dark fibre "project architecture" deployed by RENATER to support research projects with high network resources requirements. We show maps of the RENATER standard and dark fibre architectures. We summarize requirements and results for projects currently using the architecture (DEISA, LHC, Grid5000).

1. RENATER

1.1. The French Academic Network

RENATER [1] is the french national telecommunications network for technology education and research. RENATER offers about 30 Points of Presence (POPs) in France, at least one for each region on which are connected metropolitan and regional networks. More than 800 establishments (universities, research centers, . . .) are interconnected through RENATER. The deployment for the actual phase of the network (RENATER-4) has been completed by November 2005. The "standard architecture" is based on 2,5Gbit/s leased lines. It provides IP connectivity and increased capacity interconnection with GEANT-2 [2], overseas territories and the SFINX (Global Internet Exchange Point).

1.2. Dark Fibre Infrastructure

RENATER-4 introduced a new "dark fibre" infrastructure to support research projects with high network resources requirements.

Figure 1. Renater4 architecture

Figure 2. Renater4 dark fibre infrastructure
The initial topology interconnects the main POPs in France with an extension to the CERN and provides specific accesses to GEANT-2. Each link supports up to 8 "lambdas" (16 for the Paris-Lyon backbone), each lambda providing a 10Gb/s bandwidth. This infrastructure allows to allocate dedicated lambdas for specific research projects. To optimize the traffic, the architecture of the RENATER POPs have been modified so that the "project sites" are directly connected to the switches, by-passing the routers which are used for "standard" IP traffic.

2. An infrastructure for research projects

2.1. Lambda allocation

Figure 3. Renater4 Point of Presence

The dark fibre is enlighted by RENA TER which is now able to provide a Service of "lambda allocation" to carry the traffic generated by these projects. This is a unique opportunity for french, european -or even worldwide- research projects that can rely on quickly available dedicated high bandwidth resources for the reasonable cost of "an incremental lambda".

2.2. Projects by mid 2006

Several national and european research projects are already using the dark fibre infrastructure:

- DEISA [3] uses a dedicated lambda between the french computing center IDRIS and GEANT-2;
- projects involving the LHC (Large Hydron Collider) [4], typically IGTMD [5] a joined project with IN2P3 in Lyon using the interconnection with GEANT-2 to access the Fermi Labs in Chicago US;
- the most significant experiment up to now has been set up for Grid’5000 [6]. Grid’5000 is a french research Grid infrastructure with 5000 Cpu’s distributed in 9 sites in France. Here the RENATER project infrastructure provides dedicated 10Gb/s point to point interconnection inside a single VLAN. The GEANT-2 extension will be used for interconnecting Grid’5000 and the NAREGI Grid [7] in Japan.

2.3. Collaborations

This dark fibre infrastructure offers high bandwidth availability. As the lambdas are dedicated to projects there is no interference with other traffic which allows for specific research in networking. Furthermore collaboration with RENATER within those projects is encouraged to investigate new network protocols and services especially in the domain of computing, data or community grids.

References

[5] Igtmd, grid interoperability and huge data transfer to optimize processing of lh data. project launched in 2006 with support from the French National Research Agency (ANR).