Network Services

WP7 objectives, achievements and plans

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Outline

◆ Objectives from the technical annex

◆ Achievements, what we delivered

◆ Lessons learned throughout the project

◆ Exploitation and future

◆ Questions

Objectives

- Review the network service requirements of DataGrid and make detailed plans in collaboration with the European and national actors involved

  - take into account both the evolving needs of the Data Grid project

  - Based on the European research network infrastructure (GEANT project and NRENs evolutions)

- Monitor the traffic and performance of the network

  - develop models and provide tools and data for the planning of future networks

  - concentrating on the requirements of grids handling significant volumes of data.

- Study, deploy and manage advanced network and transport services

Achievements Network Monitoring

- ◆ Definition and deployment of a scalable Grid network monitoring architecture (large-scale successful usage of RGMA)

- ◆ Probe Coordination Protocol deployed, scheduling all network measurements between NMs

- ◆ Central MySQL Archive hosting all network metrics and GridFTP logging for online analysis

| RTT between sites | GridFTP analysis | Total Grid Traffic |
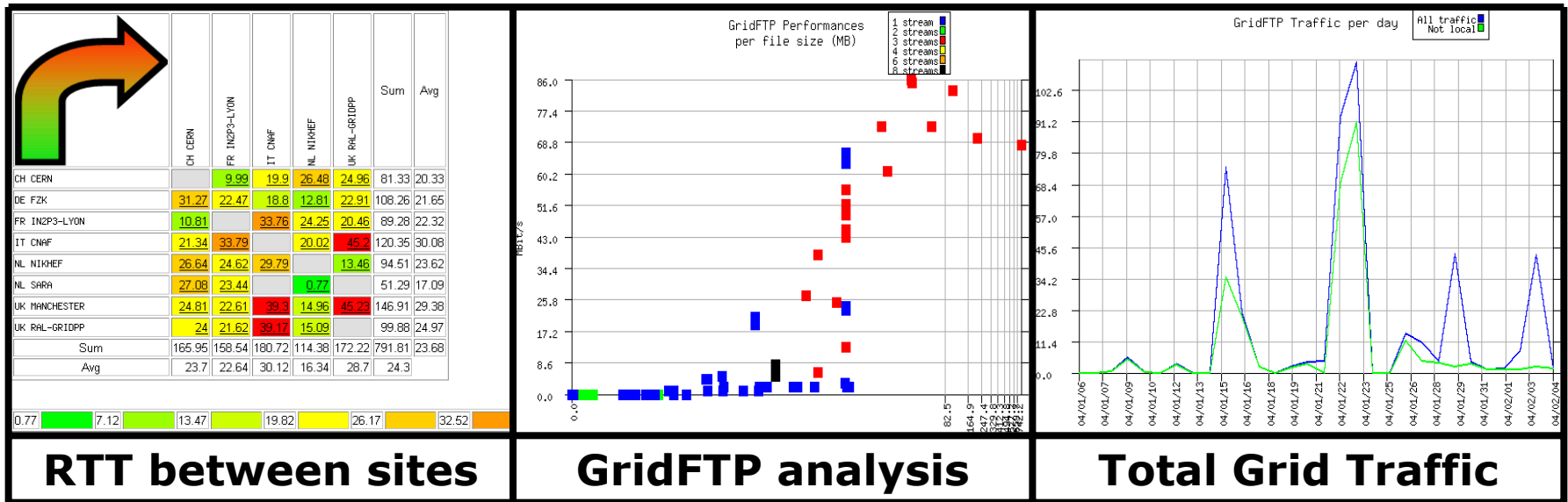
Achievements
Network Provisioning follow-up
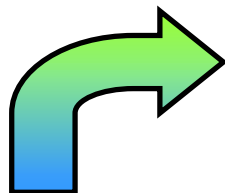
|	Croatia	France	Germany	Italy	Netherlands	Portugal	Spain	Sweden	Switzerland	Taiwan	United Kingdom	Total
Croatia					1.48K							1.48K
France			462M	2.74G	27.9G		337M		2.21M		15.4G	46.8G
Germany		4.08G		838M	21.1G	548M	43.2M				3.51G	30.1G
Italy		11.8G	18.0G		10.6G		10.5G				25.4G	76.4G
Netherlands	9.92M	128G	180G	66.4G			29.9G	14.5M	2.33G	317M	239G	646G
Portugal			13.9M									13.9M
Spain		225M	34.3M	219M	1.03G				262K		6.26G	7.77G
Sweden					6.47M							6.47M
Switzerland		133M			8.50G					124M		8.76G
Taiwan			1.20K	27.0K	84.8M							84.8M
United Kingdom		3.77G	13.6G	11.2G	20.1G		4.11G		17.5M	1.98G		54.8G
Total	9.92M	148G	212G	81.4G	89.3G	548M	44.9G	14.5M	2.35G	2.30G	290G	871G

>100 GB	>10GB	>1GB

Traffic over GEANT (last 3 months)

Achievements
Network Services

- A network transfer "cost" estimation service to provide applications and middleware with the costs of data transport
  - Called from the WP2 Replica Optimisation Service
  - Used by RBs for optimized matchmaking (getAccessCost), and also directly by applications (getBestFile)

- GEANT network tests campaign
  - Network Quality Of Service
    - LBE, IP Premium
  - High-Throughput Transfers
    - Standard and advanced TCP stacks

- Close collaboration with DANTE
  - Set-up of the testbed
  - Analysis of results
  - Access granted to all internal GEANT monitoring tools
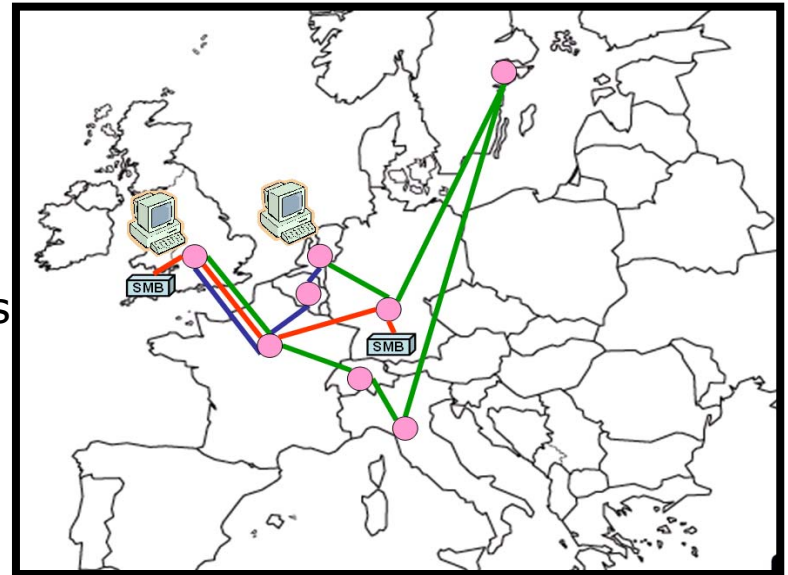
Lessons Learned

- Network monitoring is a key activity, both for provisioning and to provide accurate aggregate function for global grid schedulers.

- The investigations on network QoS carried out have led to a much greater understanding of how to utilise the network to benefit Grid operations

  - Due to the newness of theses technologies, Network QOS (LBE, IP Premium, Multicast …) implementation is a very complex task.

  - Dynamic QoS configuration and peering must be enhanced in order to work in multi-domain networks.

- We have largely benefited from close contact with DANTE and DataTAG, both at technical and management level

  - Adding significant richness to the work undertaken in WP7

  - Participation to *How-to* to bring network advances to the end-users

  - Building of a firm basis for the future interaction of the network with production Grids, and in EGEE.

Exploitation

- ◆ WP7 has worked closely with Grid standardization bodies:

  - Large participation to GGF areas and working groups, and in particular with Grid High-Performance Networking (GHPN-RG) and with Network Measurement (NM-WG).

  - Work towards a first prototype of an OGSI (Grid service) based measurement architecture

  - Close participation in the GLUE initiative

- ◆ Products developed by WP7 have been successfully deployed on EDG testbeds and also on other grid environments:

  - The WP7 Network Monitoring Infrastructure, based on standard and homemade measurement tools: CrossGrid, LCG

  - MapCenter, a grid monitoring and visualization tool: DataGRID, DataTAG, CrossGrid, LCG, GridIreland, PlanetLab, L-Bone, Atlas Grid, E-Toile, CEOS Grid, Nanyang Campus Grid, etc…

Future

- ◆ GEANT and most of NRENs are currently far from being saturated … in term of bandwidth.

- ◆ All future European network projects, and especially GN2 will concentrate efforts on network services

  - Layer 2/3 VPNs

  - Secure channels

  - Inter-domains QOS

  - End-to-end monitoring

  - Solutions for automatic and dynamic bandwidth allocation and reservation

- ◆ Future grid projects will be the major consumers of these network services

  - Large collaboration between EGEE, GN2 and others (6Net, …)

Questions ?