SA2: Networking Support Status Report

Xavier Jeannin

Activity Manager

CNRS

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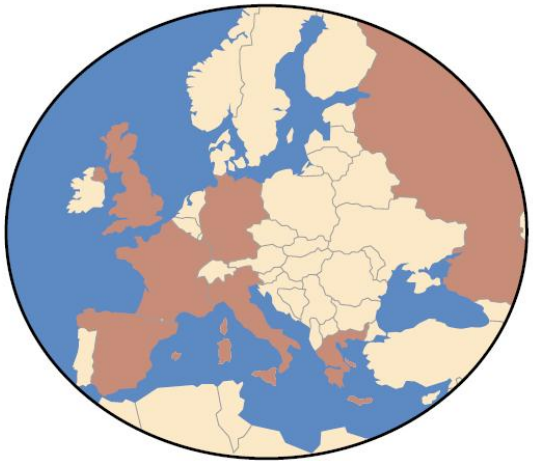
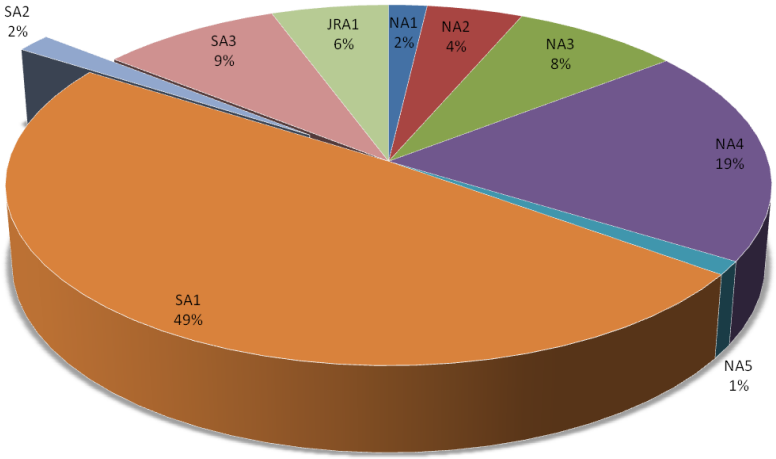
e-infrastructure

SA2 Overview

6 countries and one international entity



SA2 Budget



Country	Total PM planned at M24	Total FTE
France	96	4.0
Germany	12	0.5
Greece	18	0.8
Italy	12	0.5
Russia	6	0.3
Spain	6	0.3
DANTE (GEANT2)	3	0.1
Total PM planned at M24	**153**	
Total FTE		**6.4**

SA2 Global view

SA2 – EGEE-III

TSA2.1 ENOC running

TSA2.2 Support for the ENOC

- Operational procedures (CNRS)
- WLCG Support (CNRS)
- Operational tools and maintenance (RRC-KI, CNRS)
- Monitoring (DFN)
  - Grid Network Monitoring (CNRS / GARR)
  - Troubleshooting (DFN)
  - Site networking needs (RedIRIS)

TSA2.4 Management and general project task

TSA2.3 Overall Networking coordination

- IPv6 (GARR, CNRS)
- TT exchange standard (GRNET)
- Advanced network services (GRNET)
- TNLC

Network connectivity assessment

- **Done with a SA2 home grown network monitoring system within the EGEE Network Operation Centre (ENOC)**
  - Doing network tests on all Grid nodes every two minutes

Trouble ID	Site	Current status	Date started UTC	Date ended UTC	Date updated UTC	Downtime	Location
ENOC-TD-110049	PH-	UNREACHED	2010-05-17 04:37:13		2010-05-17 13:33:18	8 hours 56 minutes 5 seconds	ON-SITE
ENOC-TD-110026	PreGR-0	UNREACHED	2010-05-16 20:01:22		2010-05-17 13:33:08	17 hours 31 minutes 46 seconds	UNABLE TO KNOW
ENOC-TD-110078	ESA-E	REACHED	2010-05-17 13:17:23	2010-05-17 13:33:52	2010-05-17 13:33:52	16 minutes 29 seconds	ON-SITE
ENOC-TD-110066	ITPA-L	REACHED	2010-05-17 08:59:19	2010-05-17 09:09:51	2010-05-17 09:09:51	10 minutes 32 seconds	ON-SITE
ENOC-TD-110058	NIH	REACHED	2010-05-17 06:45:23	2010-05-17 06:52:01	2010-05-17 06:52:01	6 minutes 38 seconds	UNABLE TO KNOW
ENOC-TD-110046	ID-I	REACHED	2010-05-17 04:03:45	2010-05-17 04:07:56	2010-05-17 04:07:56	4 minutes 11 seconds	ON-SITE
ENOC-TD-110032	UKI-L	REACHED	2010-05-16 23:11:34	2010-05-16 23:42:00	2010-05-16 23:42:00	30 minutes 26 seconds	UNABLE TO KNOW

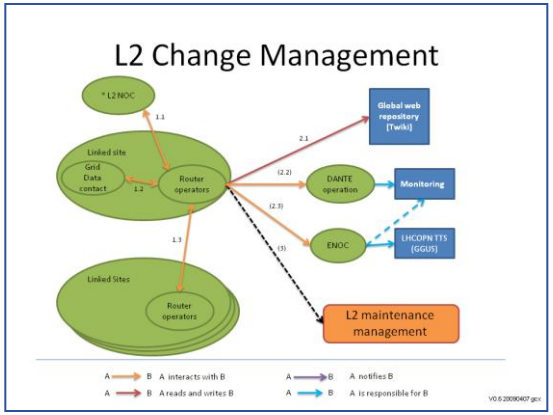
- **Lessons learnt during EGEE-III on certified Grid sites (~315):**
  - Network incidents are not concentrated on few ‘bad’ sites
    - Biggest sites have also network incidents!
  - More than half of connectivity problems detected are located on-sites
    - Especially problematic for datacenters
  - 80% of incidents within network providers are solved in less than 30 minutes
    - Only ~45/month take longer

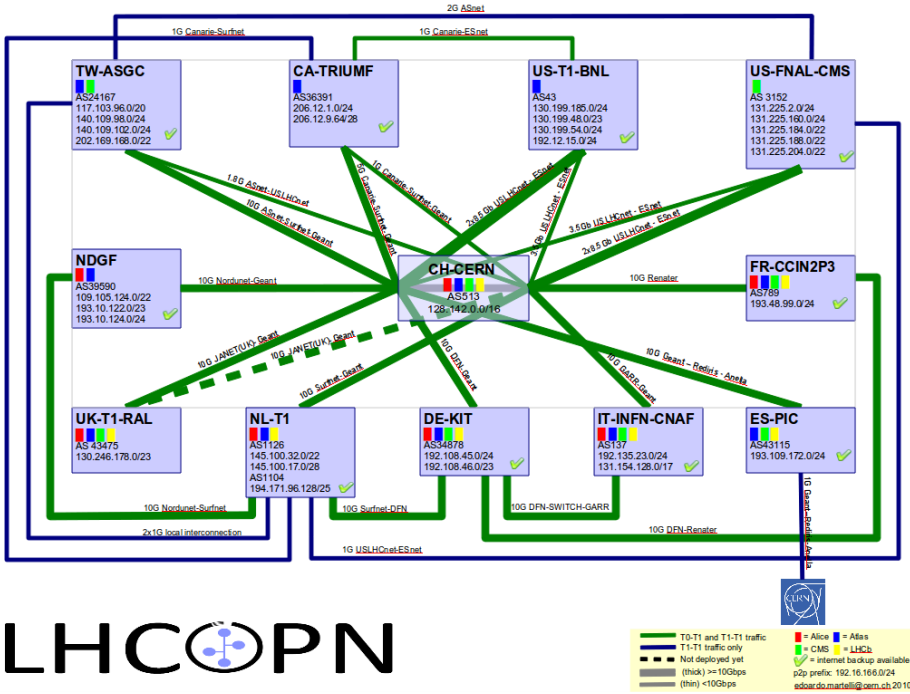
ENOC transition

- **Lessons learnt from EGEE**
  - Very few Grid user notifications about network problems
  - NRENs, regional network providers will provide a first line local/regional support to users
- **The strong budget constraints led to only keep the network coordination within EGI**
- **The ENOC will not be maintained within EGI, only two tools will be kept**
  - DownCollector and PerfSONAR-Lite TSS
  - The transition has been well managed with SA2 partners and these tools were installed within GARR premises.

WLCG support (1/2)

- **SA2 take the lead in designing and implementing a pioneering federated operational model for the LHCOPN**
  - Large Hadron Collider Optical Private network
    - Linking CERN and 11 major computer centres
  - Designing and documenting processes, discussing them, getting agreements, organising trainings...
  - Shaping and organising tools to fit it
    - Including a GGUS helpdesk tailored for the LHCOPN thanks to SA1

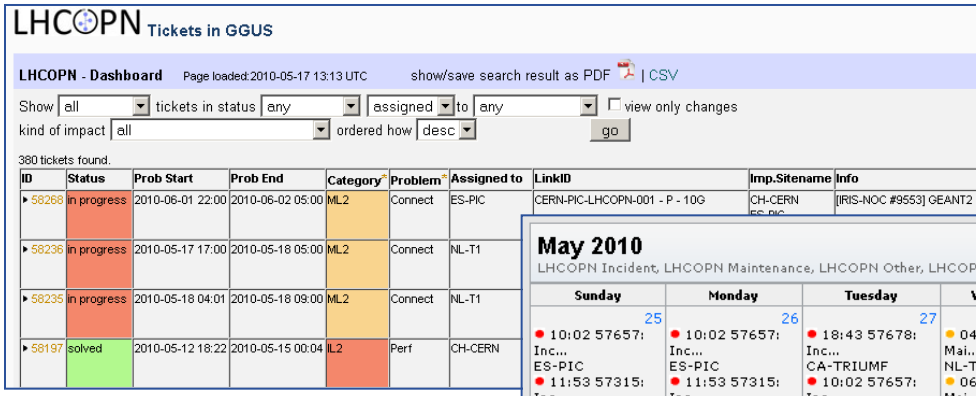


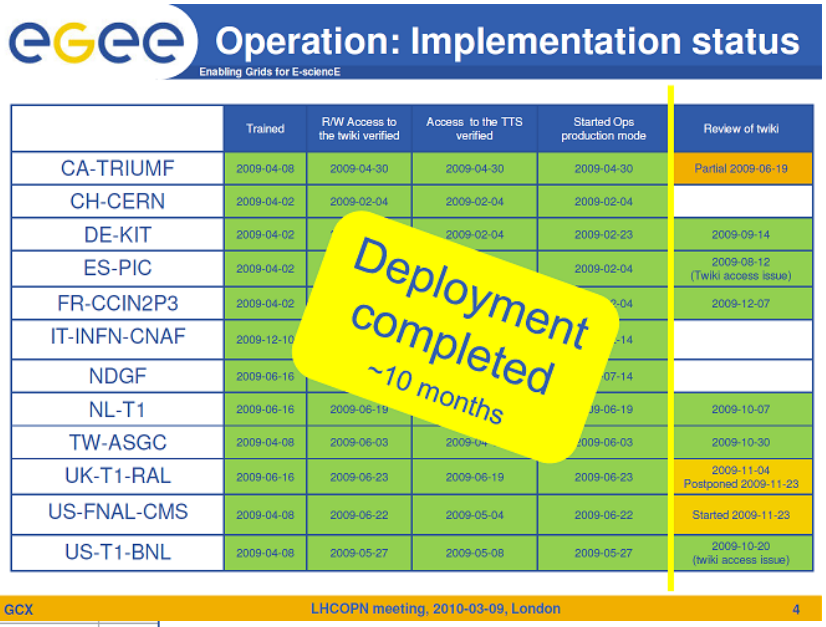


LHCOPN

WLCG support (2/2)

- **Each site is in charge of the piece of network linking it to CERN**
  - Coordination as light as possible
- **Deployment successfully achieved since 2010-01**
  - A 10 months work!

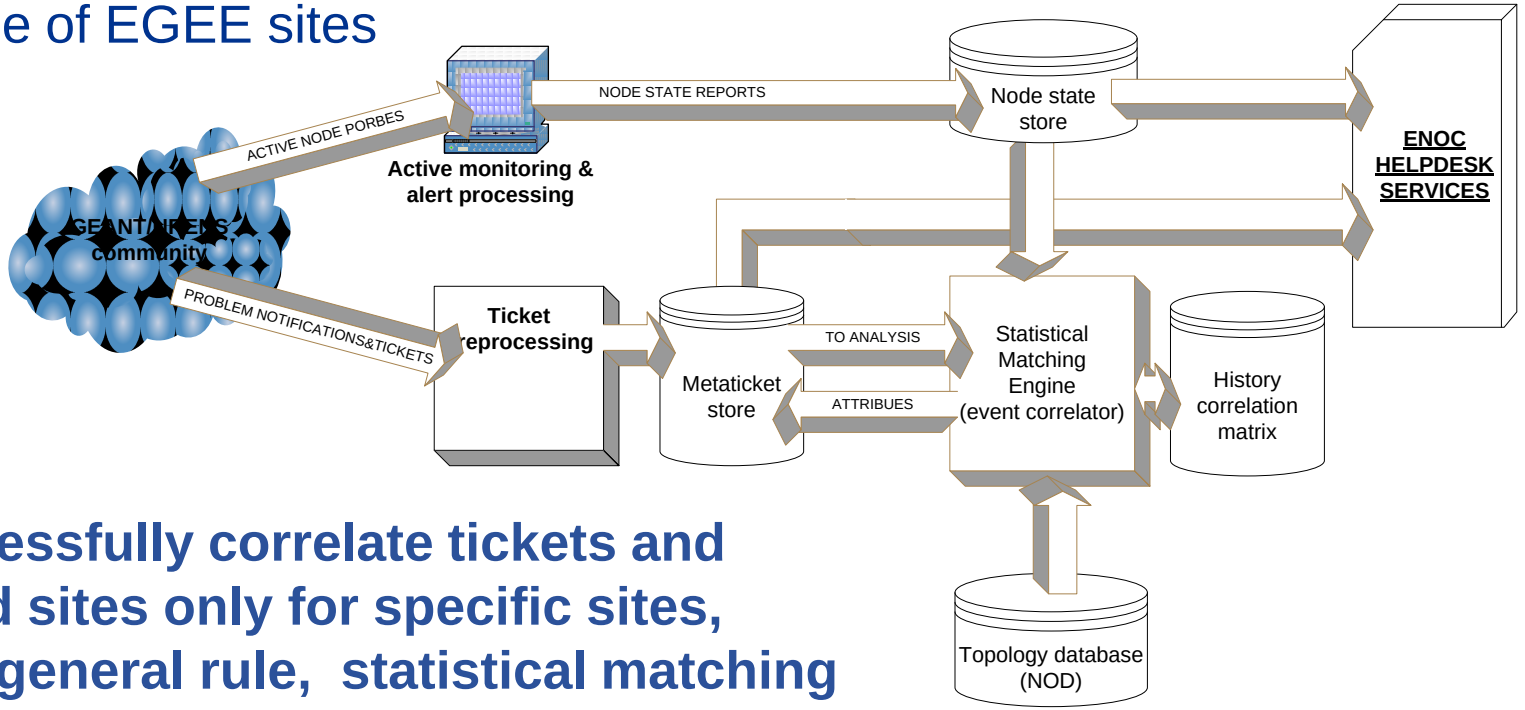




- **Further work will be continued through WLCG**
  - Improvement process, following KPIs...

Operational tools and maintenance

- **incident matching and correlation for the ENOC**
  - Correlate tickets with monitoring data
  - Better assessment of the impact on the Grid of incident tickets
  - Be able to warn the Grid operation in case of network connectivity outage of EGEE sites

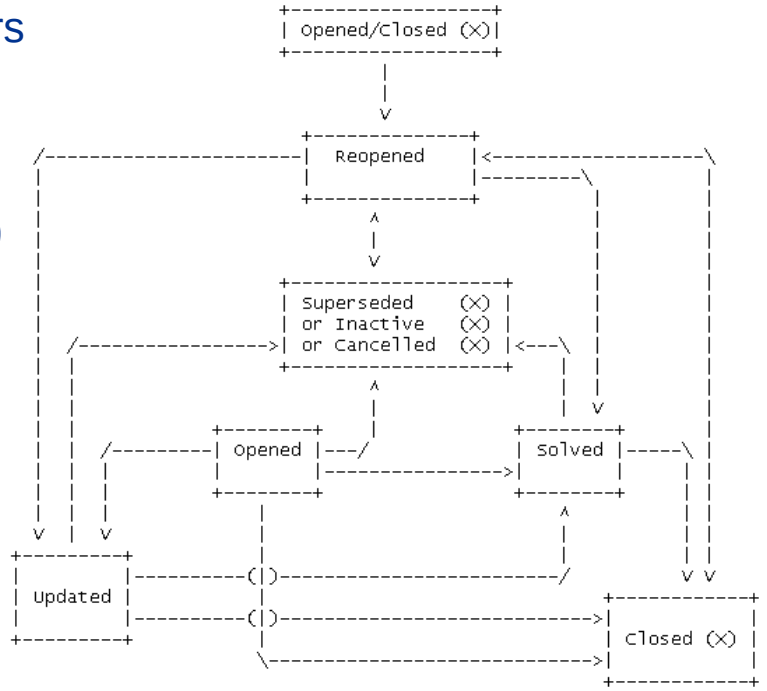


- **We successfully correlate tickets and impacted sites only for specific sites, but as a general rule, statistical matching fails to reliably map the majority of incoming incident tickets**
  → prove the need of an improvement of NREN's tickets.

Trouble ticket exchange standardization

- **Ticket normalization is very important to improve efficiency of project's wide network operations (impact assessment)**
  - Standardizing interfaces with network providers
  - EGEE initiated a standardization process

- **A draft RFC *(draft-dzis-nwg-nttdm-00)* about the normalization of the incident tickets is currently under review**
  - "The Network Trouble Ticket Data Model" Internet Draft
    http://tools.ietf.org/html/draft-dzis-nwg-nttdm-02

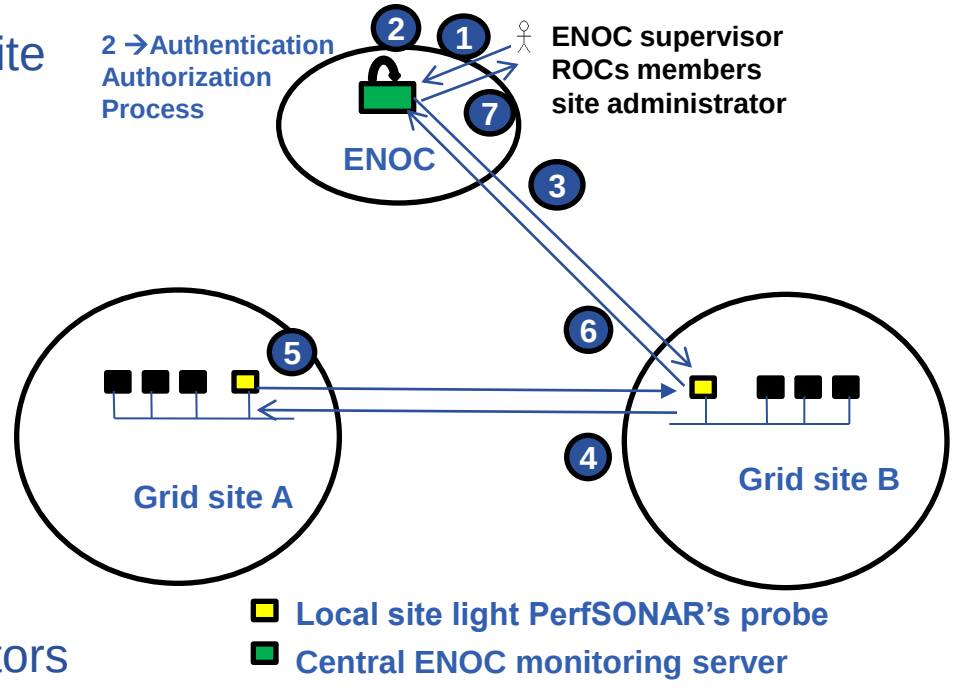


Trouble ticket status transition diagram

- **GRNET provided the ENOC of with a new version central server translating NREN's tickets into standard tickets and the open source software is published at**
  - http://code.grnet.gr/projects/tt-handler/repository

Network monitoring tools

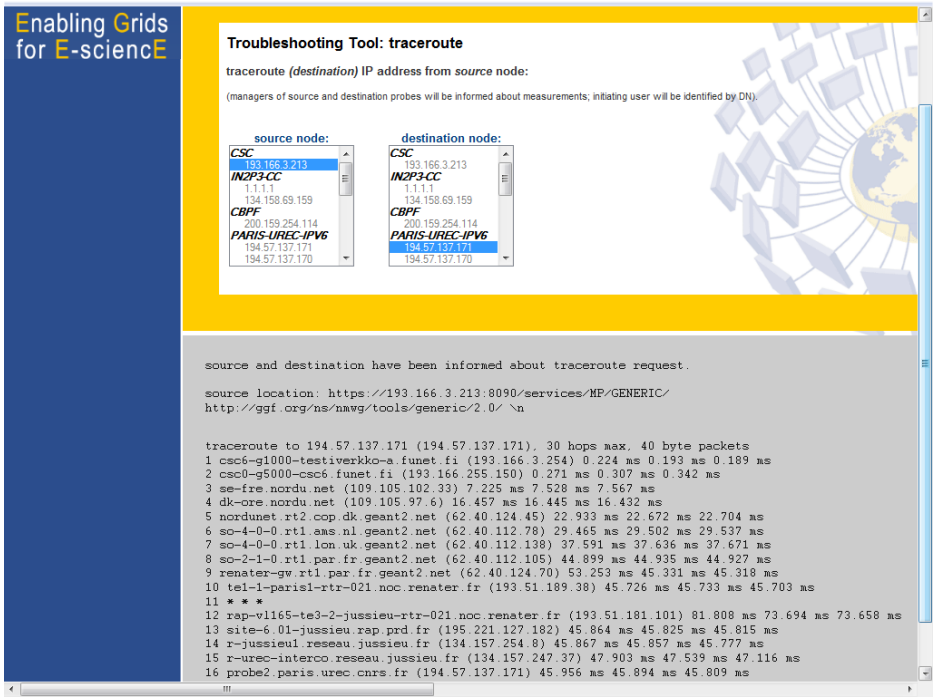
- **Network monitoring tools for efficient remote troubleshooting**
  - **PerfSONAR-Lite TroubleShooting Service**
  - Launch test on demand from a Grid site under central server control:
    - Bandwidth measurements, DNS lookup, Traceroute, Port testing, Ping

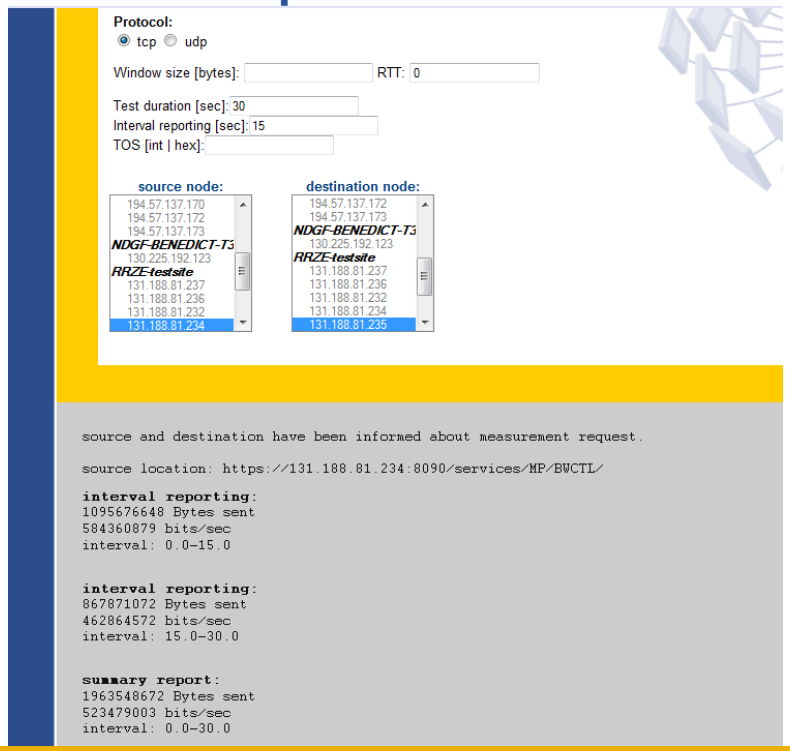


- **PerfSONAR-Lite TSS**
  - is easy to use for the Grid administrators
  - can be used quickly by site admin without the obligation to make contact with the remote site involved in the problem
  - fills the lack of network diagnostic tool

Network monitoring tools

- **First version was released and installed on 6 sites**
- **Installation guide and procedure**
  - http://www.dfn.de/en/enhome/x-win/download-of-perfsonar-lite-tss/
  - FAQ, tutorial, new features (users, sites, ROC management)
  - Software authorization schema was adapted to be able to fit with hierarchical EGI/NGI model
- **Difficult to deploy the software during the transition phase toward EGI**



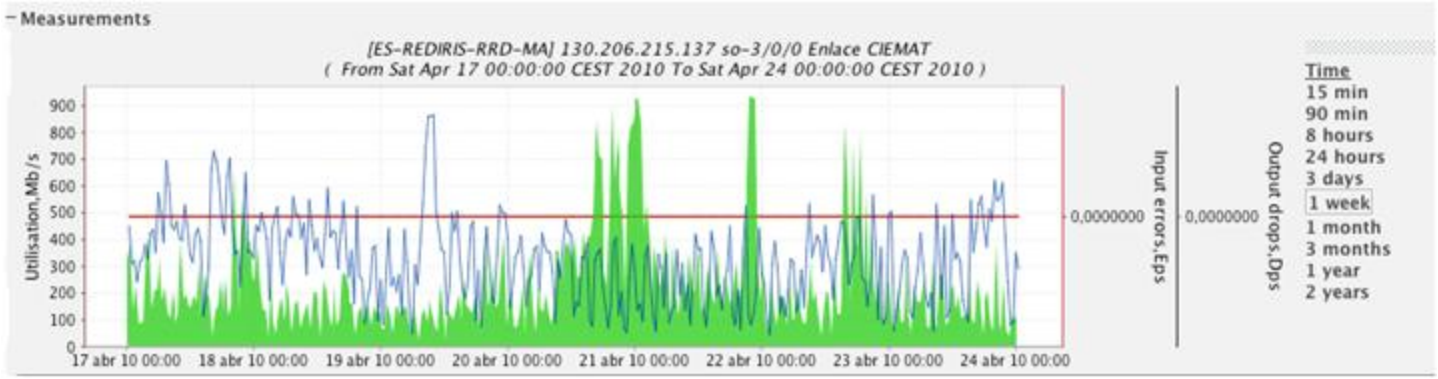


Sites networking needs

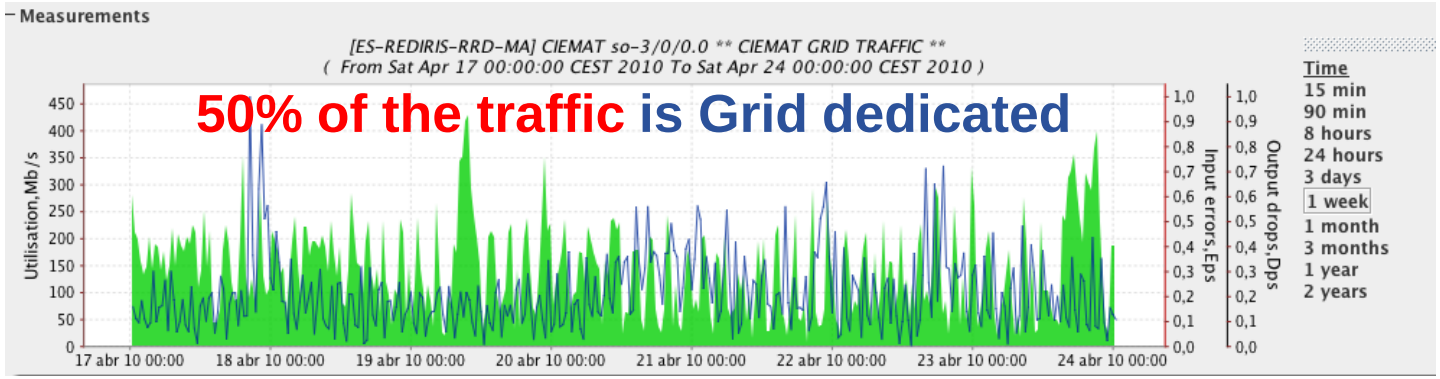
- **Deployment of a network monitoring tool "perfSONAR" at country scale**
  - RedIRIS provides significantly more effort for this task than funded through EGEE
  - PerfSONAR is deployed into EGEE sites and into networks used
  - connected to LHCOPN monitoring solution
- **An ISO auto-installable DVD with all the perfSONAR MDM bundle on it was created: http://ftp.rediris.es/perfsonar/**
- **Issues**
  - the process of deployment is long due to the necessary collaboration of regional networks and sites
- **Assess network requirements (bandwidth, delay, jitter, etc.) for a site within the Grid / empirical approach**
- **The study was led on PIC site (Spanish Tier 1), RedIRIS (Spanish NREN), CESCA (regional network) and CIEMAT Spanish Tier 2 site**

Sites networking needs

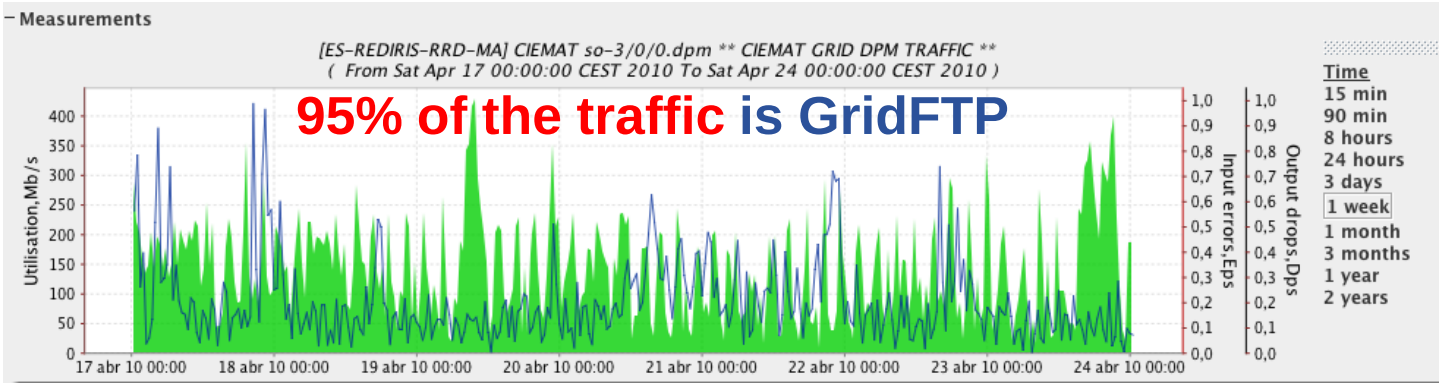
Total inbound/outbound traffic from/for CIEMAT in the same period of time



Grid inbound/outbound traffic from/for CIEMAT (Tier 2)

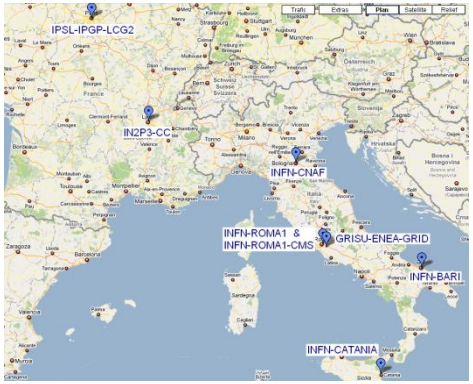


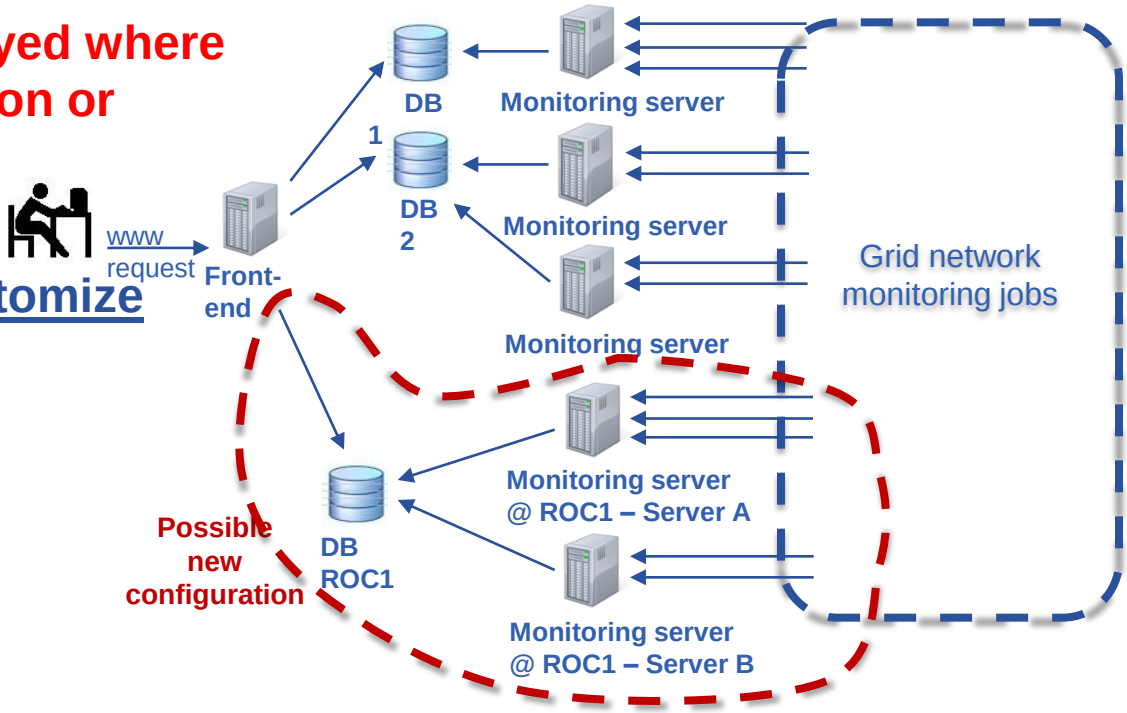
Grid DPM service traffic in the same period of time



Network monitoring based on grid job

- Metrics: RTT, MTU, Hop count, bandwidth (passive, active)
- No solution available, SA2 was not charge of this task and an unfunded work provided by CNRS and GARR
- A solution that can be deployed where there is no monitoring solution or not a perspective solution
- A scalable solution
- Very easy to deploy and customize
- Prototype tested on 8 sites





- A demonstration of front-end (access to collected data) is available:
  - http://indico.cern.ch/materialDisplay.py?contribId=1&materialId=video&confId=85761

Advanced network services

- **Collaboration with AMPS team - Advanced Multi-domain Provisioning System – in order to automate network SLA establishment**
  - AMPS will not be deployed beyond the 3 NRENs that have already deployed it
- **Development of a web interface to manage the EGEE SLA requests**
  - Store and manage the EGEE users' SLA requests
- **An extensive study was published in MSA2.4 on advanced network services available in Europe and in USA (Internet2, National Lambda Rail and ESNET):**
  - **AMPS, AutoBHAN, GLIF/Fenius, Phosphorus, IDC and Sherpa**
  - **Most of theses services are at prototype level and the availability in the domains where EGEE is deployed is a paramount criteria**
  - **Phosphorus seems the most mature tool at the end of EGEE**
  - **AutoBAHN (Automated Bandwidth Allocation across Heterogeneous Networks) will benefit from a big investment of GEANT3 project and is expected to be deployed in production environment by 4-5 NRENs by March 2011**

Technical Network Liaison Committee

- **Four TNLC meetings:**
  - Ease the technical discussions between EGEE, the NRENs/GÉANT2
  - Participants: EGEE SA2, GÉANT2/DANTE, some of the NRENs involved in the EGEE activities and CERN
- **Foster collaboration between NRENs and Grid (EGEE)**
  - SA2 organised the “Joint EGEE SA2 - TERENA NRENs and Grids Workshop” in Barcelona http://www.terena.org/activities/nrens-n-grids/workshop-08/programme.html

- **Work mainly focused on:**
  - Monitoring
  - Improvement of incident ticket contents
    - Improve the assessment of the impact of problems on the Grid
  - Future collaboration EGI/NRENs:
    - should be supported, in the future, by NRENs
    - should continue thanks to working groups focussing on specific topics

IPv6 support 1/2

- **IPv4 public address exhaustion hardening the deployment of new Grid sites**
- **IPv6 CARE, an IPv6 compliance toolbox**
  - "Check mode" allows to test IPv6 compliance of programs on-the-fly
  - "Patch mode" allows to patch programs on-the-fly in order to make them IPv6 compliant
  - Whenever you are checking or patching a program, you do not need its source code
    http://sourceforge.net/projects/ipv6-care
- **Many informative studies**

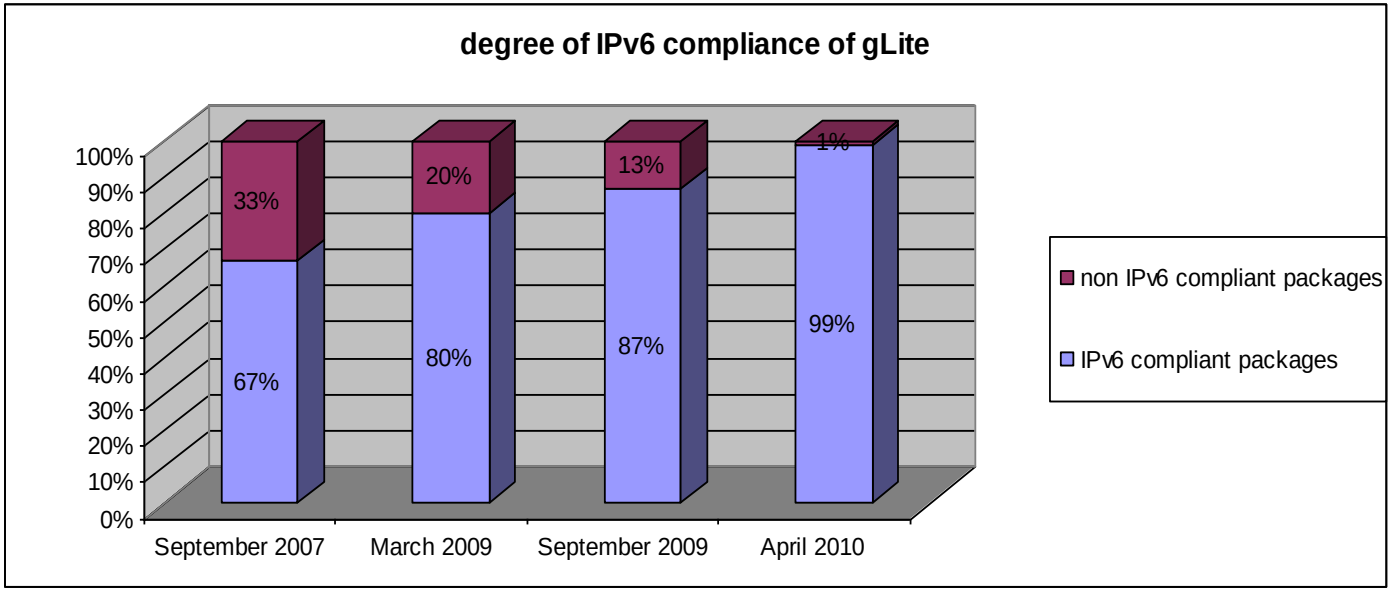
  https://twiki.cern.ch/twiki/bin/view/EGEE/IPv6FollowUp
  - IPv6 programming method C/C++, Java, Python and Perl / IPv6 testing method
    - gSOAP / Axis / Axis2 / Boost:asio / gridFTP / PythonZSI / PerlSOAPLite
  - Assessment of the IPv6 compliance of gLite components: DPM & LFC, BDII, WMS, CREAM, WMS/Wmproxy, globus-url-copy/gridFTP, Lcg-utils

IPv6 support 2/2

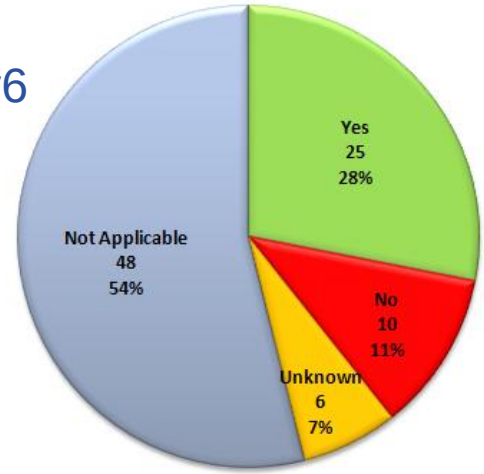
- **SA2 provides 2 testbeds (Paris/Roma) to check IPv6 compliance**
- Dissemination: meetings, training session, demonstration, video
- **Demonstration of the 2 first dual stack IPv4/IPv6 sites of EGEE at User Forum 09 → *smooth transition to IPv6***
- **During the second year of EGEE, SA2 IPv6 testbed (i.e. CNRS – GARR sites) has been integrated into EGEE validation testbed**

IPv6: final status

- Analysis of the gLite source code
  - Using the IPv6 metric (IPv6 code checker) in ETICS to point out 75 parts of the code where there are indications of possible of non-compliant function calls:
    - 111 bugs declared only 3 bugs left
  - This analysis effectively helped developers to work on IPv6



Assessment of the evolution obtained on the gLite repository of ETICs (developing version)



IPv6 compliance of external dependencies

SA2 summary

- **SA2 activity has completed all tasks and objectives for EGEE-III**
- **ENOC**
  - Release of PerfSONAR-Lite TroubleShooting Services
  - SA2 has provided an extra effort to design and implement an original network monitoring lightweight solution
  - An original solution for the impact assessment of incident ticket has been developed
- **WLCG: Design and implementation of the LHCOPN operational model**
- **An extensive study on advanced network services available in Europe and in USA has been provided**
- **IPv6**
  - Improvement of gLite (99%) / IPv6 CARE / 2 first dual-stack sites / smooth transition to IPv6
- **Trouble tickets exchange standardization**
  - Translation software and submission of a RFC, "The Network Trouble Ticket Data Model", Internet Draft
- **Collaboration with NRENs, TNLC**
  - EGEE 09 – TERENA NRENs & Grid joint meeting, Barcelona Sept. 2009
- **Transition toward EGI-NGI**
  - Tools have been migrated and transition achieved