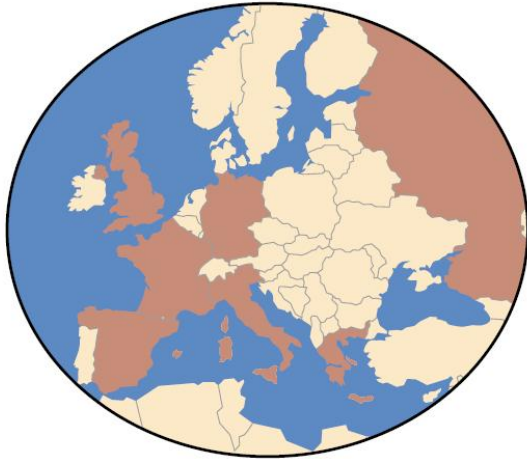


SA2: Networking Support Status Report

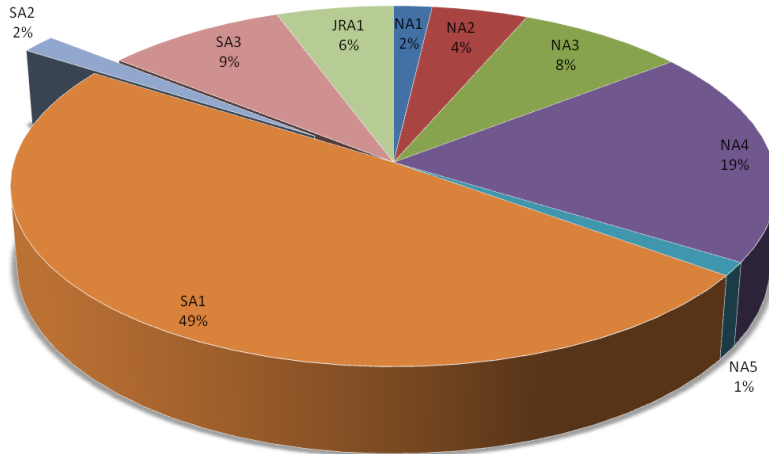
Xavier Jeannin
Activity Manager
CNRS

EGEE-III Final Review, 23-24 June, 2010

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 – 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

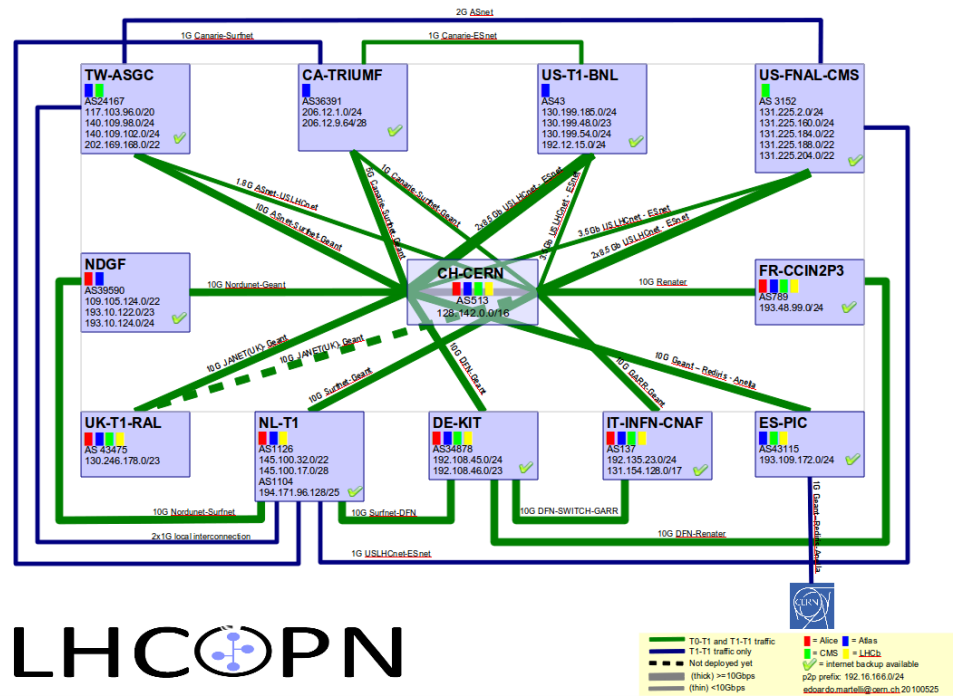
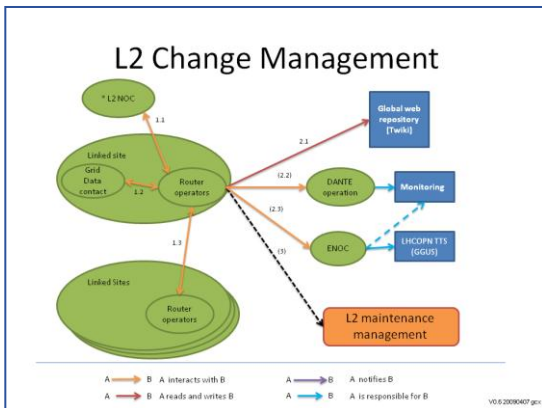
- Done with a SA2 home grown network monitoring system within the EGEE Network Operation Centre (ENOC)
 - Doing network tests on all Grid nodes every two minutes

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	NIM-██████████	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

- **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.

- 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



- 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!

EGEE Operation: Implementation status
Enabling Grids for E-science

LHCOPN Tickets in GGUS

LHCOPN - Dashboard Page loaded: 2010-05-17 13:13 UTC show/save search result as PDF CSV

Show tickets in status assigned to view only changes

kind of impact ordered how

380 tickets found.

ID	Status	Prob Start	Prob End	Category	Problem	Assigned to	LinkID	Imp.Sitename	Info
58268	In progress	2010-06-01 22:00	2010-06-02 05:00	ML2	Connect	ES-PIC	CERN-PIC-LHCOPN-001 - P - 10G	CH-CERN	[IRIS-NOC #9553] GEANT2
58236	In progress	2010-05-17 17:00	2010-05-18 05:00	ML2	Connect	NL-T1			
58235	In progress	2010-05-18 04:01	2010-05-18 09:00	ML2	Connect	NL-T1			
58197	Solved	2010-05-12 18:22	2010-05-15 00:04	IL2	Perf	CH-CERN			

May 2010

LHCOPN Incident, LHCOPN Maintenance, LHCOPN Other, LHCOPN

Sunday	Monday	Tuesday
<p>25</p> <ul style="list-style-type: none"> ● 10:02 57657: Inc... ES-PIC ● 11:53 57315: Inc... US-T1-BNL 	<p>26</p> <ul style="list-style-type: none"> ● 10:02 57657: Inc... ES-PIC ● 11:53 57315: Inc... US-T1-BNL ● 18:43 57678: Inc... CA-TRIUMF ● 23:00 BGP peer d... CA-TRIUMF 	<p>27</p> <ul style="list-style-type: none"> ● 18:43 57678: Inc... CA-TRIUMF ● 10:02 57657: Inc... ES-PIC ● 23:00 BGP peer d... CA-TRIUMF

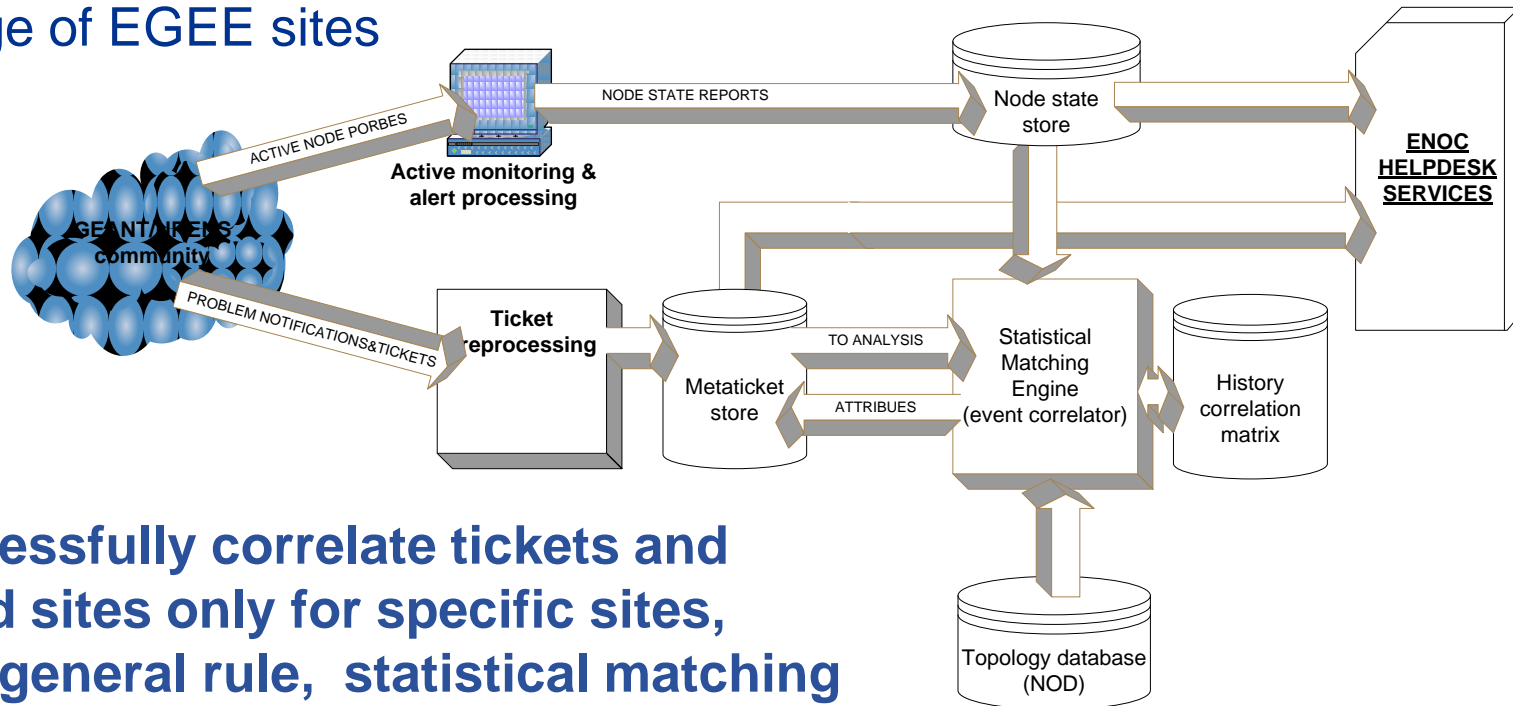
	Trained	R/W Access to the twiki verified	Access to the TTS verified	Started Ops production mode	Review of twiki
CA-TRIUMF	2009-04-08	2009-04-30	2009-04-30	2009-04-30	Partial 2009-06-19
CH-CERN	2009-04-02	2009-02-04	2009-02-04	2009-02-04	
DE-KIT	2009-04-02		2009-02-04	2009-02-23	2009-09-14
ES-PIC	2009-04-02			2009-02-04	2009-08-12 (Twiki access issue)
FR-CCIN2P3	2009-04-02			2009-02-04	2009-12-07
IT-INFN-CNAF	2009-12-10			2009-02-14	
NDGF	2009-06-16			2009-07-14	
NL-T1	2009-06-16	2009-06-19		2009-06-19	2009-10-07
TW-ASGC	2009-04-08	2009-06-03	2009-06-03	2009-06-03	2009-10-30
UK-T1-RAL	2009-06-16	2009-06-23	2009-06-19	2009-06-23	2009-11-04 Postponed 2009-11-23
US-FNAL-CMS	2009-04-08	2009-06-22	2009-05-04	2009-06-22	Started 2009-11-23
US-T1-BNL	2009-04-08	2009-05-27	2009-05-08	2009-05-27	2009-10-20 (twiki access issue)

Deployment completed ~10 months

LHCOPN meeting, 2010-03-09, London 4

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

- 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

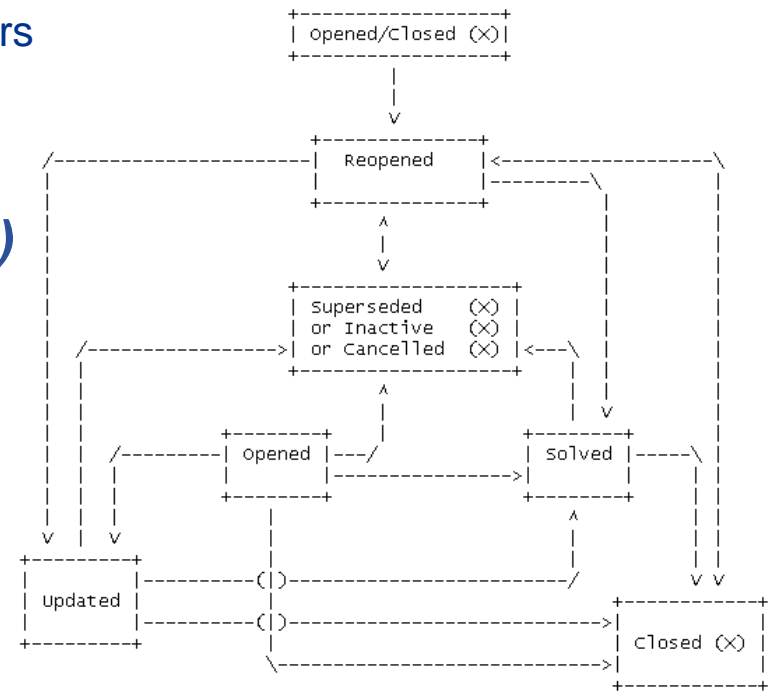


- We successfully correlate tickets and impacted sites only for specific sites, but as a general rule, statistical matching fails to reliably map the majority of incoming incident tickets
 → prove the need of an improvement of NREN's tickets.

- 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>



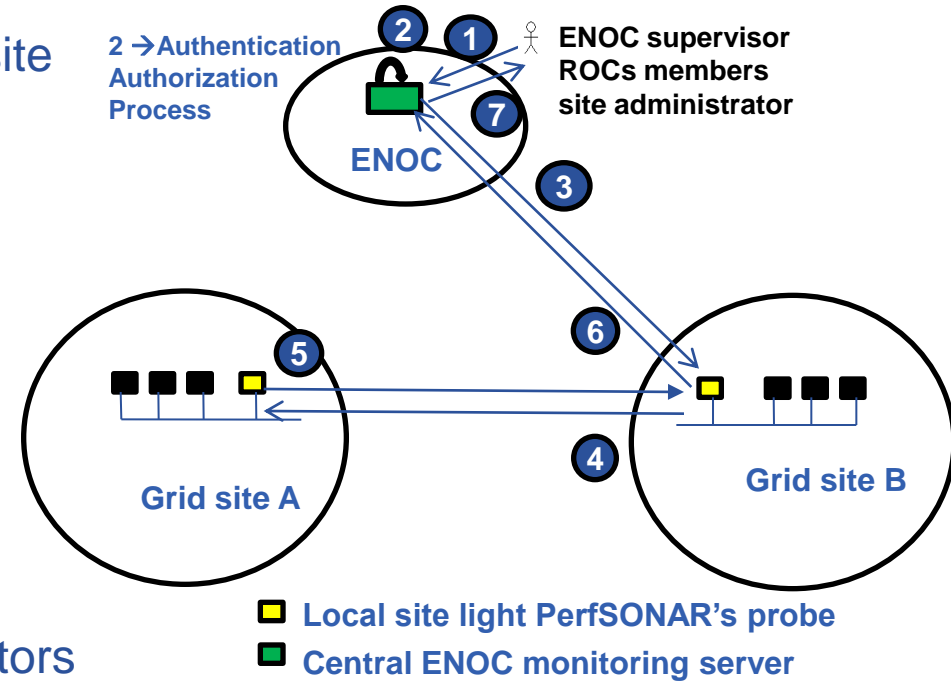
Trouble ticket status transition diagram

- 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 for efficient remote troubleshooting

PerfSONAR-Lite TroubleShooting Service

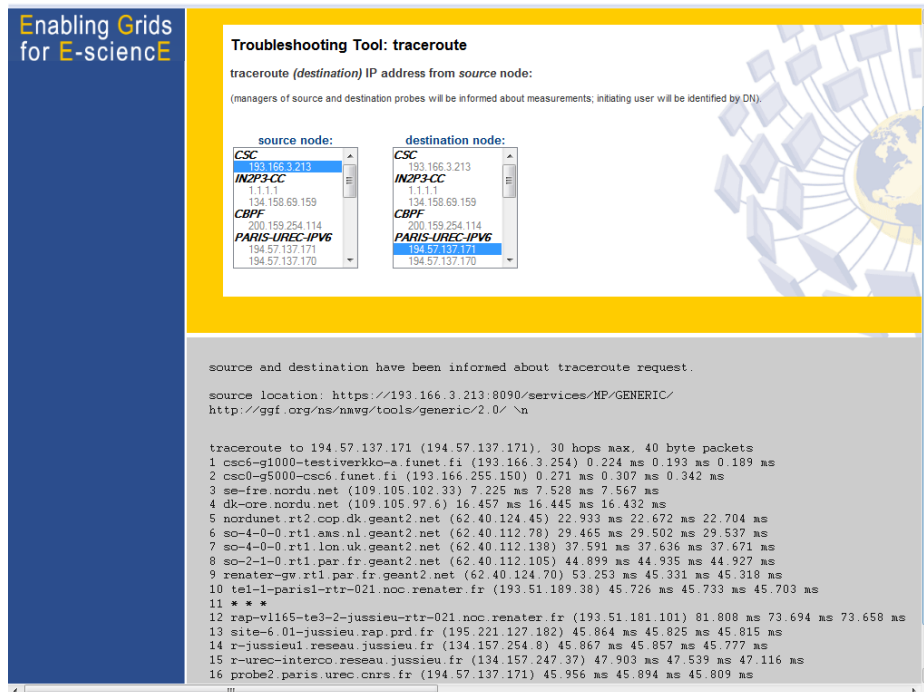
- Launch test on demand from a Grid site under central server control:
 - Bandwidth measurements, DNS lookup, Traceroute, Port testing, Ping



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**

- 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



Troubleshooting Tool: traceroute

traceroute (destination) IP address from source node:
(managers of source and destination probes will be informed about measurements; initiating user will be identified by DN)

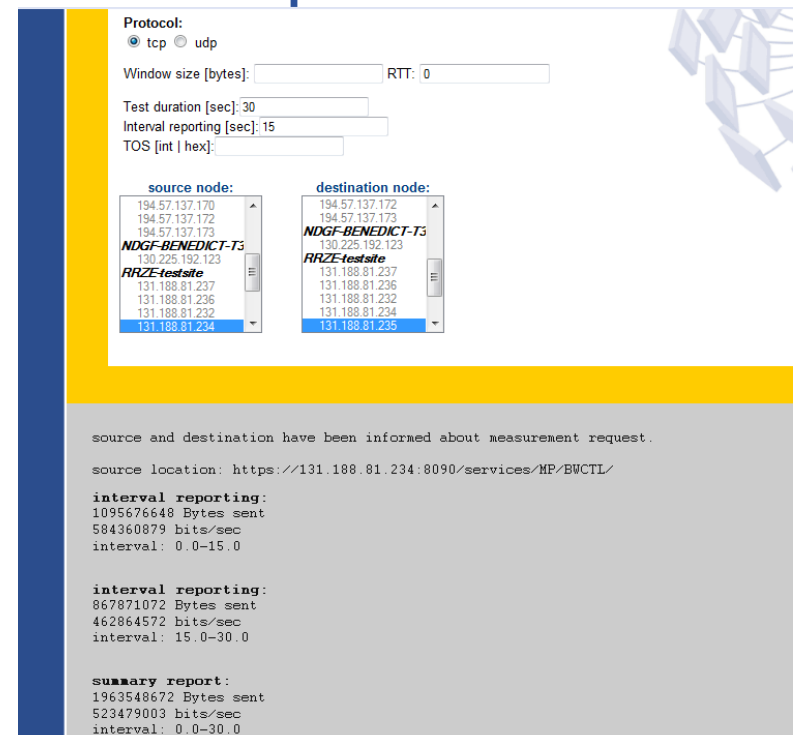
source node:	destination node:
CSC 193.166.3.213	CSC 193.166.3.213
IN2P3-CC 1.1.1.1	IN2P3-CC 1.1.1.1
CBPF 34.158.69.159	CBPF 34.158.69.159
200.159.254.114	200.159.254.114
PARIS-UREC-IPV6 194.57.137.171	PARIS-UREC-IPV6 194.57.137.171

source and destination have been informed about traceroute request.

source location: <https://193.166.3.213:8090/services/MP/GENERIC/>
<http://ggi.org/ns/nwg/tools/generic/2.0/> \n

```

traceroute to 194.57.137.171 (194.57.137.171), 30 hops max, 40 byte packets
 1 csc-g1000-testivikko-a.funet.fi (193.166.3.254) 0.224 ms 0.193 ms 0.189 ms
 2 csc0-g5000-csc6.funet.fi (193.166.255.150) 0.271 ms 0.307 ms 0.342 ms
 3 se-fre.nordu.net (109.105.102.33) 7.225 ms 7.528 ms 7.567 ms
 4 dk-ore.nordu.net (109.105.97.6) 16.457 ms 16.445 ms 16.432 ms
 5 nordunet.rt2.cop.dk.geant2.net (62.40.124.45) 22.933 ms 22.672 ms 22.704 ms
 6 so-1-0-0.rtl1.ams.nl.geant2.net (62.40.112.78) 29.465 ms 29.502 ms 29.537 ms
 7 so-4-0-0.rtl1.lon.uk.geant2.net (62.40.112.138) 37.591 ms 37.636 ms 37.671 ms
 8 so-2-1-0.rtl1.par.fr.geant2.net (62.40.112.105) 44.899 ms 44.935 ms 44.927 ms
 9 renater-gw.rtl1.par.fr.geant2.net (62.40.124.70) 53.253 ms 45.331 ms 45.318 ms
 10 tel-1-paris1-rtr-021.noc.renater.fr (193.51.189.38) 45.726 ms 45.733 ms 45.703 ms
 11 * * *
 12 rap-vl165-te3-2-jussieu-rtr-021.noc.renater.fr (193.51.181.101) 81.808 ms 73.694 ms 73.658 ms
 13 site-6.01-jussieu.rap.prd.fr (195.221.127.182) 45.864 ms 45.925 ms 45.815 ms
 14 r-jussieu1.reseau.jussieu.fr (194.157.254.9) 45.867 ms 45.857 ms 45.777 ms
 15 r-urec-interco.reseau.jussieu.fr (134.157.247.37) 47.903 ms 47.539 ms 47.116 ms
 16 probe2.paris.urec.cnrs.fr (194.57.137.171) 45.956 ms 45.894 ms 45.809 ms
    
```



Protocol:
 tcp udp

Window size [bytes]: RTT:

Test duration [sec]:

Interval reporting [sec]:

TOS [int | hex]:

source node:	destination node:
194.57.137.170	194.57.137.172
194.57.137.172	194.57.137.173
194.57.137.173	NDGF-BENEDICT-T3
NDGF-BENEDICT-T3	130.225.192.123
130.225.192.123	RRZE-testsite
RRZE-testsite	131.188.81.237
131.188.81.237	131.188.81.236
131.188.81.236	131.188.81.232
131.188.81.232	131.188.81.234
131.188.81.234	

source and destination have been informed about measurement request.

source location: <https://131.188.81.234:8090/services/MP/BWCTL/>

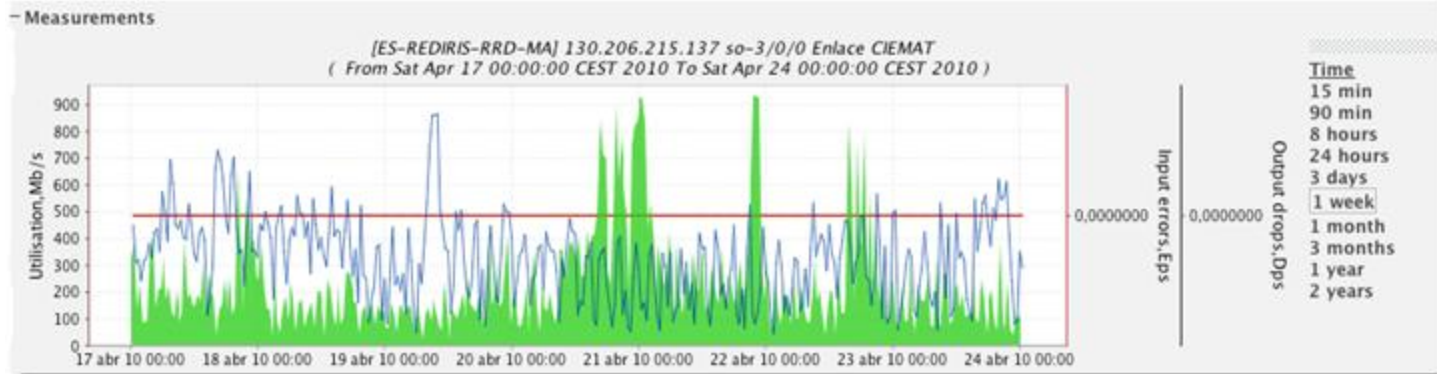
interval reporting:
1095676648 Bytes sent
584360879 bits/sec
interval: 0.0-15.0

interval reporting:
867871072 Bytes sent
462864572 bits/sec
interval: 15.0-30.0

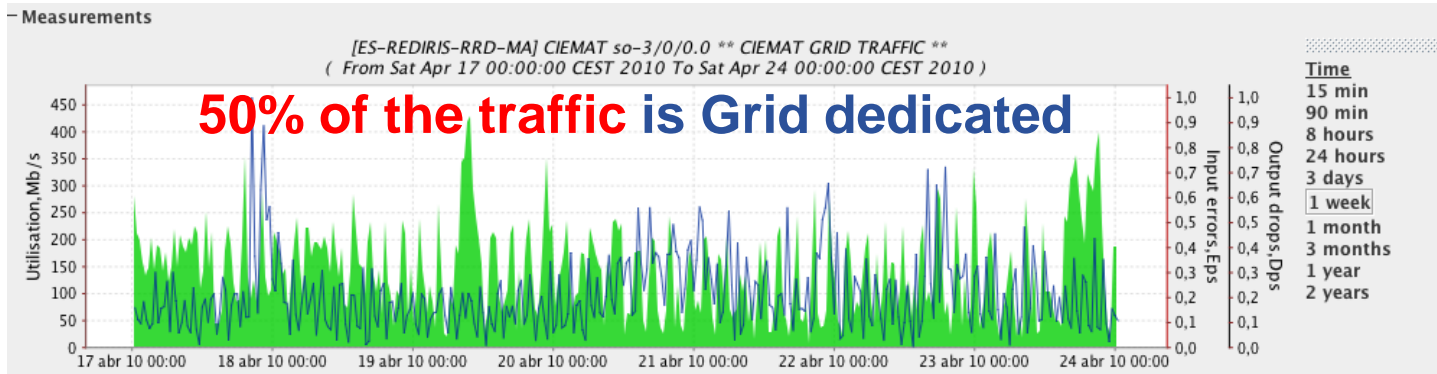
summary report:
1963548672 Bytes sent
523479003 bits/sec
interval: 0.0-30.0

- **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), CESCO (regional network) and CIEMAT Spanish Tier 2 site**

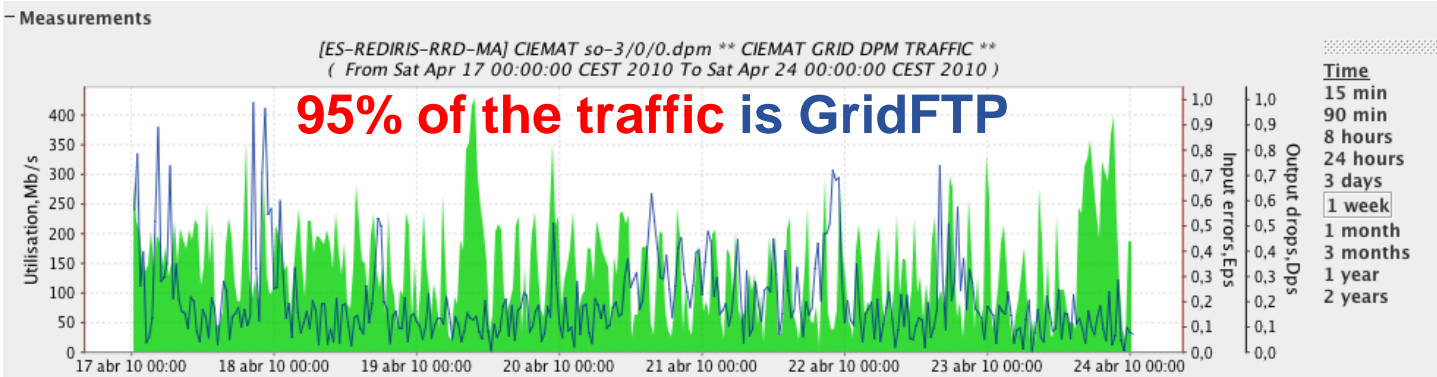
Total inbound/outbound traffic
from/for CIEMAT in the same period of time



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



Grid DPM service traffic
in the same period of time



- Time
- 15 min
 - 90 min
 - 8 hours
 - 24 hours
 - 3 days
 - 1 week
 - 1 month
 - 3 months
 - 1 year
 - 2 years

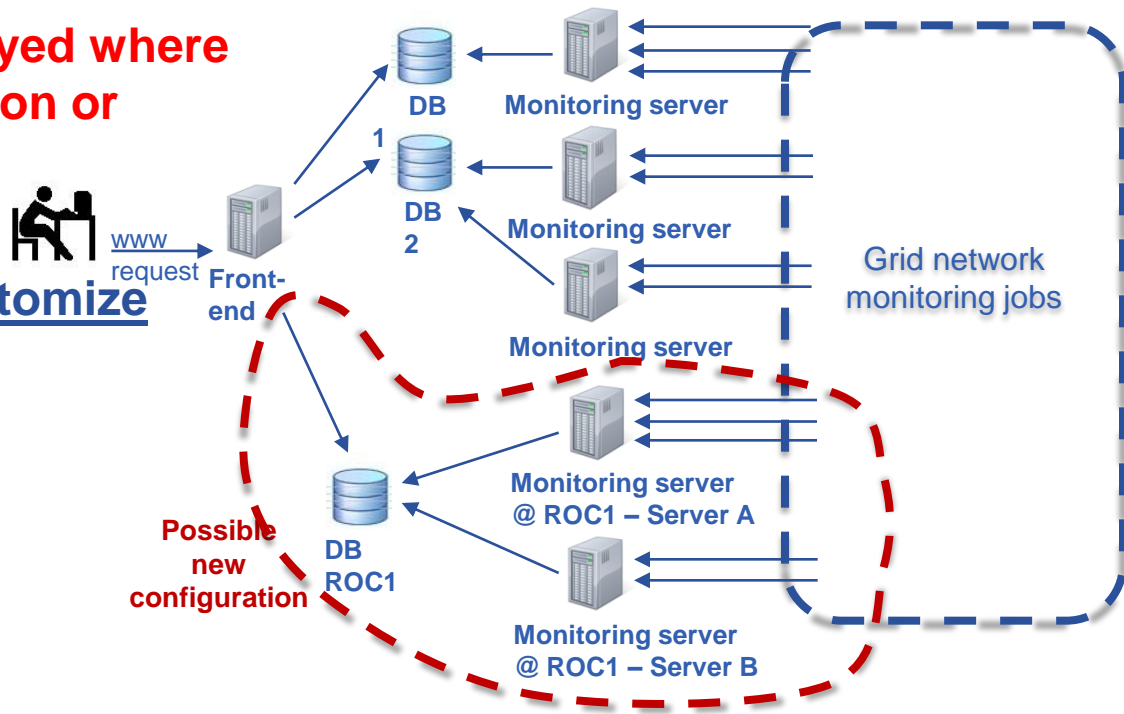
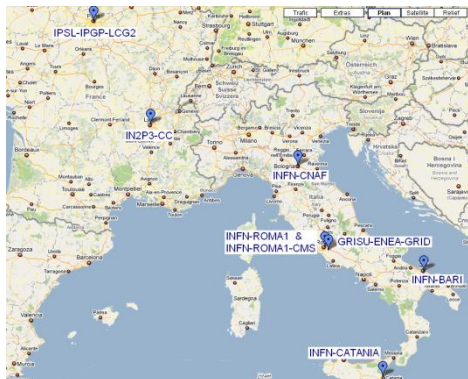
- Time
- 15 min
 - 90 min
 - 8 hours
 - 24 hours
 - 3 days
 - 1 week
 - 1 month
 - 3 months
 - 1 year
 - 2 years

- Time
- 15 min
 - 90 min
 - 8 hours
 - 24 hours
 - 3 days
 - 1 week
 - 1 month
 - 3 months
 - 1 year
 - 2 years

- 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>

- **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 these 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**

- **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

- **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**

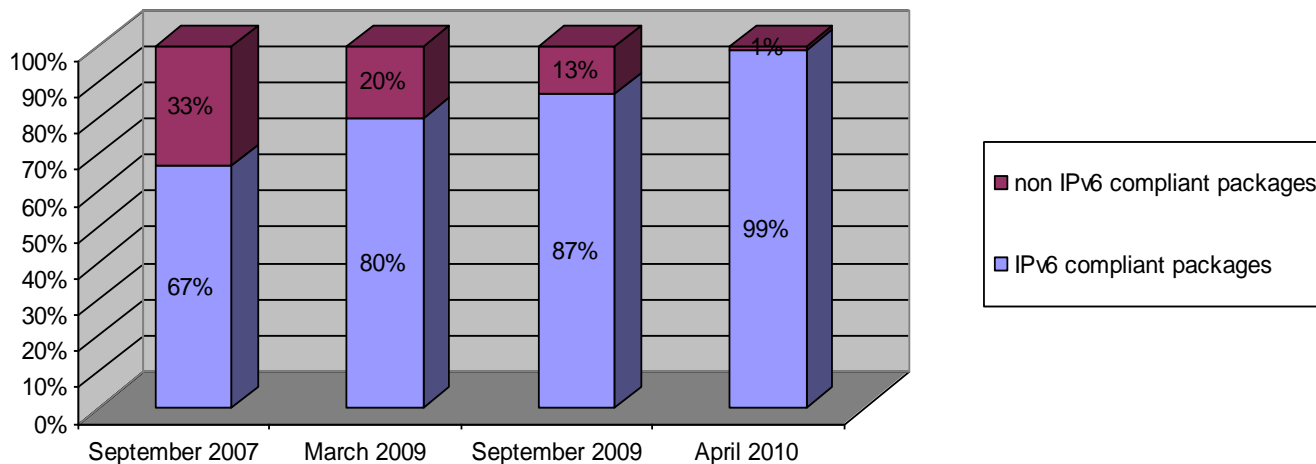
<https://twiki.cern.ch/twiki/bin/view/EGEE/IPv6FollowUp>

- 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

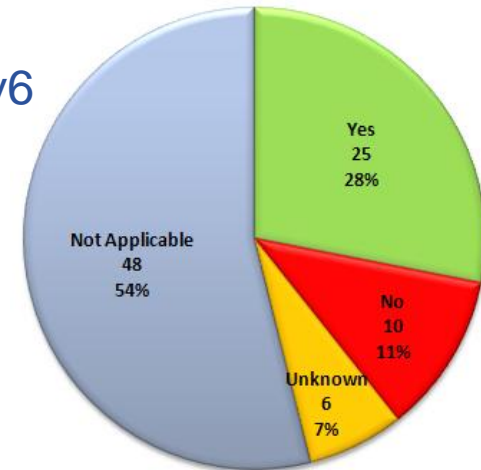
- SA2 provides 2 testbeds (Paris/Roma) to check IPv6 compliance
- Dissemination: meetings, training session, demonstration, video
- Demonstration of the 2 first dual stack IPv4/IPv6 sites of EGEE at User Forum 09 → *smooth transition to IPv6*
- During the second year of EGEE, SA2 IPv6 testbed (i.e. CNRS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

- 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

degree of IPv6 compliance of gLite



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



IPv6 compliance of external dependencies

- **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