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Проектите GÉANT2 и GÉANT3

Нина Желязкова
Лъчезар Илиев
ИПОИ – БАН
nina, iliev @ acad.bg

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Съдържание

GEANT2 http://www.geant2.net/

Топология

Партньори

Предоставяни услуги

Изследователска дейност

GEANT3

Резюме на проекта

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What is GÉANT2?

An European Research & Education Networking Model

- Pan-European research network infrastructure
- Project time scale September 2004 - August 2008 (extended Feb 2009, April 2009)
- Project partners
  - European Commission
  - 30 of Europe's national research and education networks (NRENs)
  - DANTE and TERENA
- Funded jointly by NRENs and European Commission
- Connects 34 European countries and serves over 3500 research and education establishments across Europe
- Over 30 million users

Provides extensive international connectivity to other world regions

Provide a gigabit-speeds infrastructure to support European research and education

Provide a research infrastructure for network technology developments

Deploy the first international hybrid network: routed IP traffic combined with switched point-to-point circuits

Implement end-to-end QoS provision

Develop a wider range of network services (more on next slides)

Coordinate RTD activities

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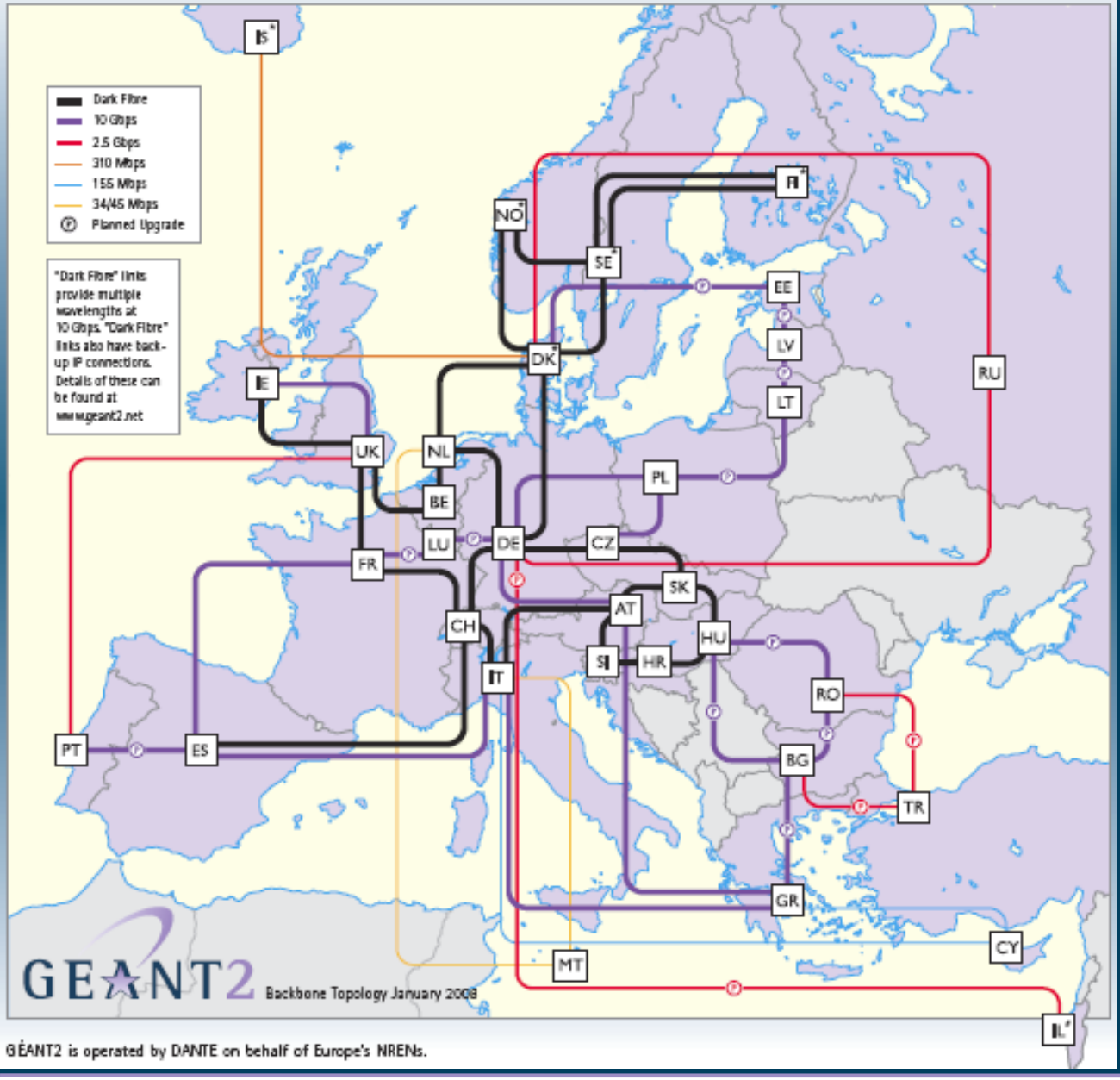

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GÉANT2 Topology

NRENs provide high performance services to researchers across the world

Very high throughput and availability

Low latency and jitter, access to new technologies

A range of network services

GÉANT2

Global topology

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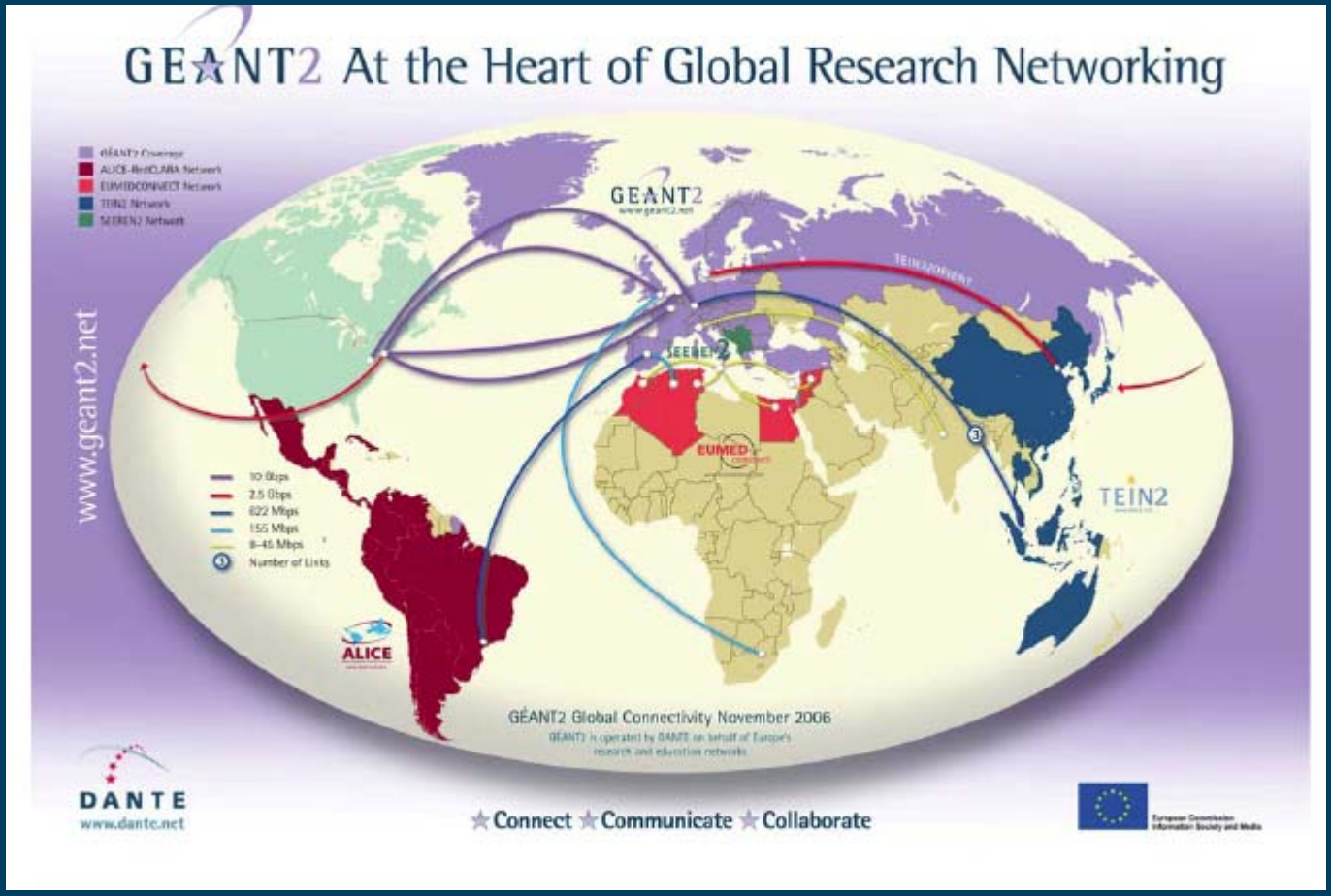

NREN (National Research and Educational Networks)

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http://www.terena.org/activities/compendium/2008/pdf/TERENA-Compendium-2008.pdf

Информация от TERENA Compendium 2008

http://www.terena.org/activities/compendium/

- NREN (National Research and Educational Networks)
  - има във всички европейски страни с изключение на
    - Албания
    - Босна и Херцеговина
  - В Русия и САЩ има по повече от една организация, изпълняваща функциите на NREN
- NREN се различават по много параметри (следва)

Външна свързаност

http://www.terena.org/activities/compendium/2008/pdf/TERENA-Compendium-2008.pdf

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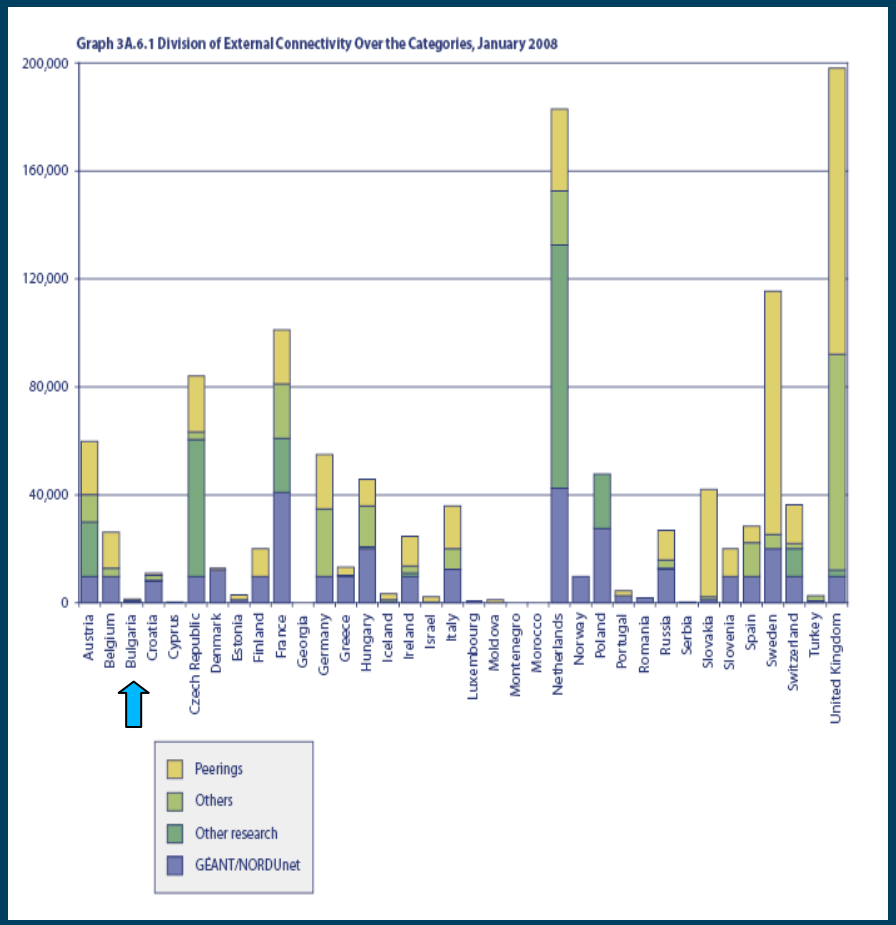

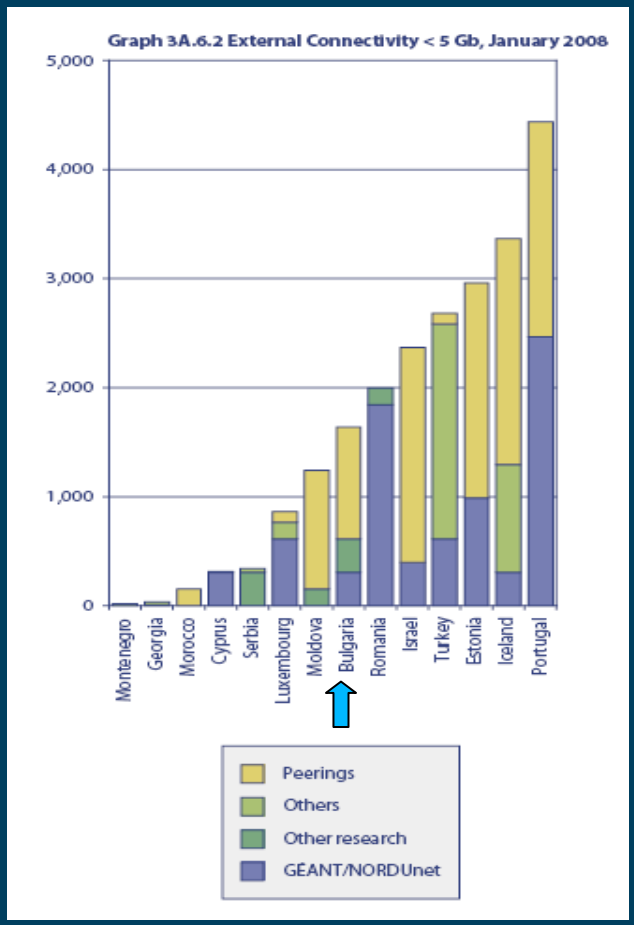

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Вътрешна свързаност

http://www.terena.org/activities/compendium/2008/lists/network.php

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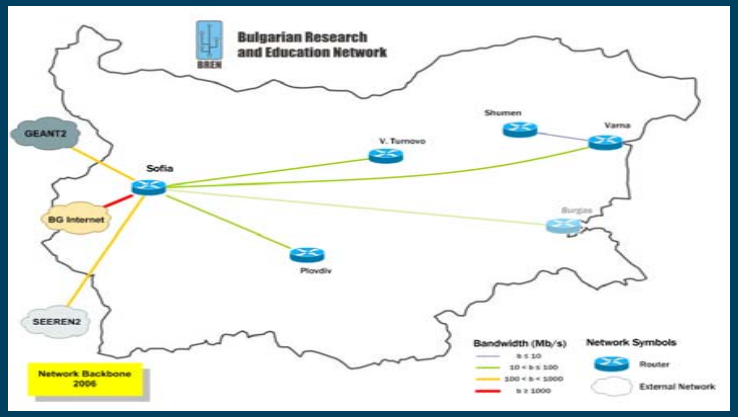
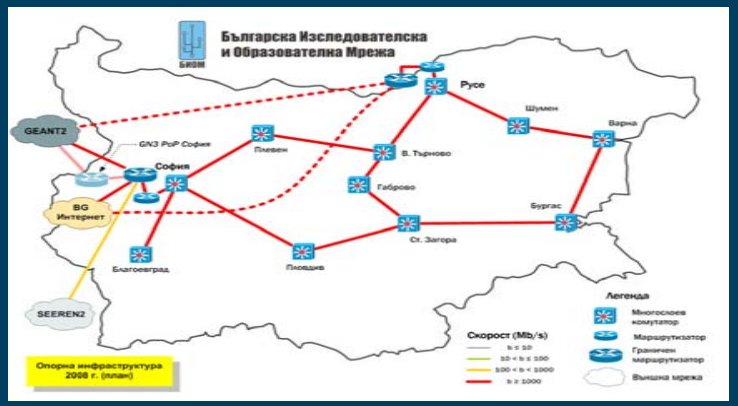
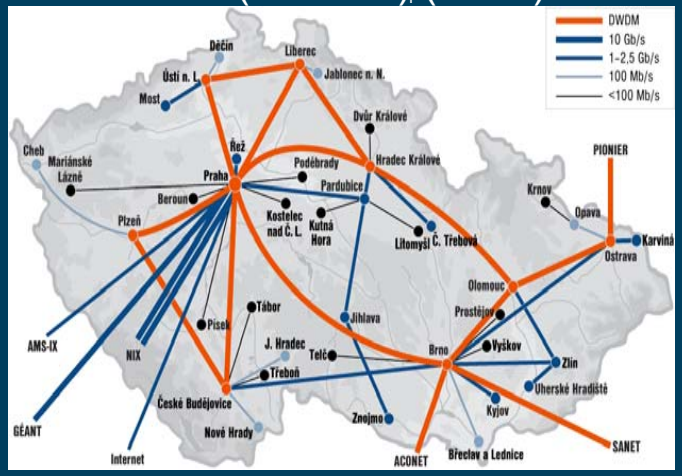


(Почти) актуално състтояние 2006 и днес



План за 2008, подготвен от ФТИО през есента на 2006. Не е известна официална информация че БИОМ ипълнява този или друг план

Словения (ARNES) (2008)



Чехия (CESNET) (2008)

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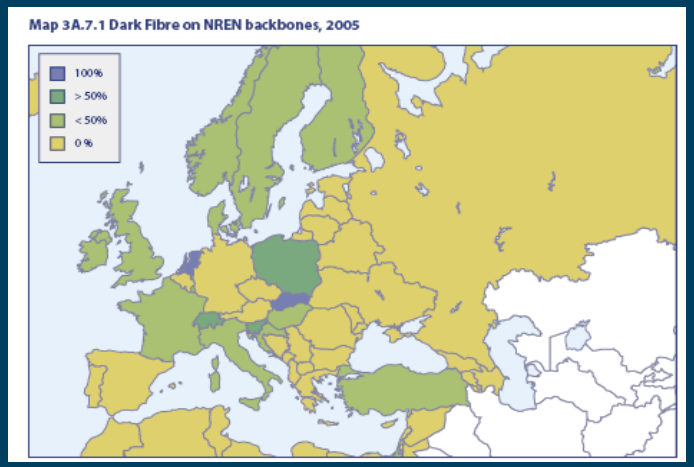
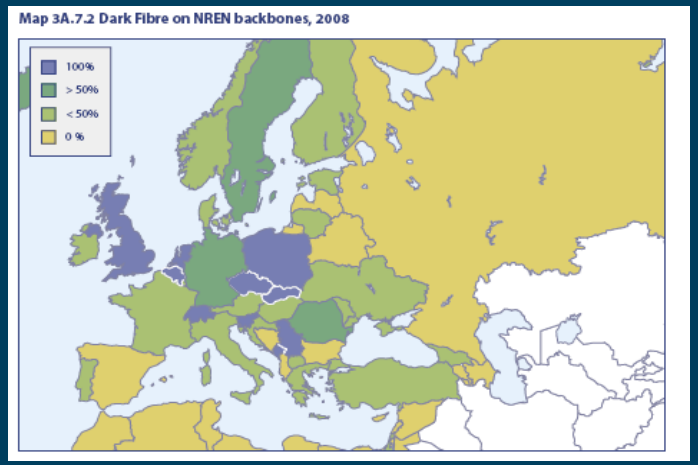
Dark Fiber on NREN backbones

http://www.terena.org/activities/compendium/2008/pdf/TERENA-Compendium-2008.pdf





Dark Fiber on NREN Cross borders

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NREN YEARLY MEETING, 25-26.11.2008
Hotel “Hisar”, Hisar

Бюджет

http://www.terena.org/activities/compendium/2008/pdf/TERENA-Compendium-2008.pdf

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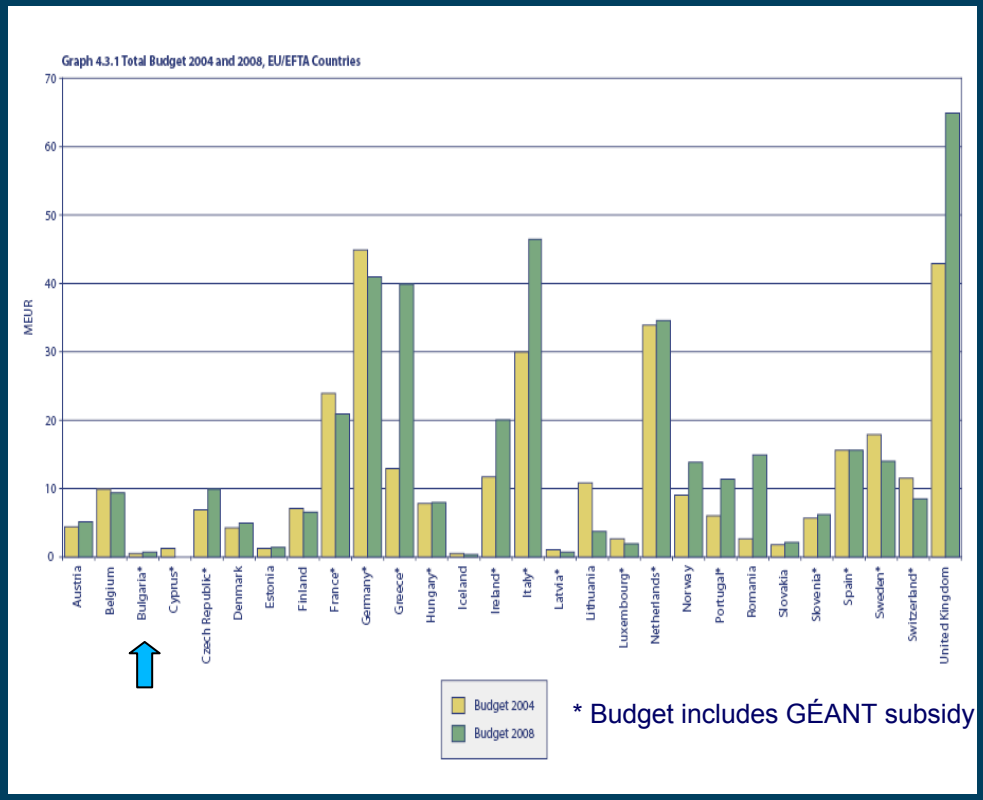

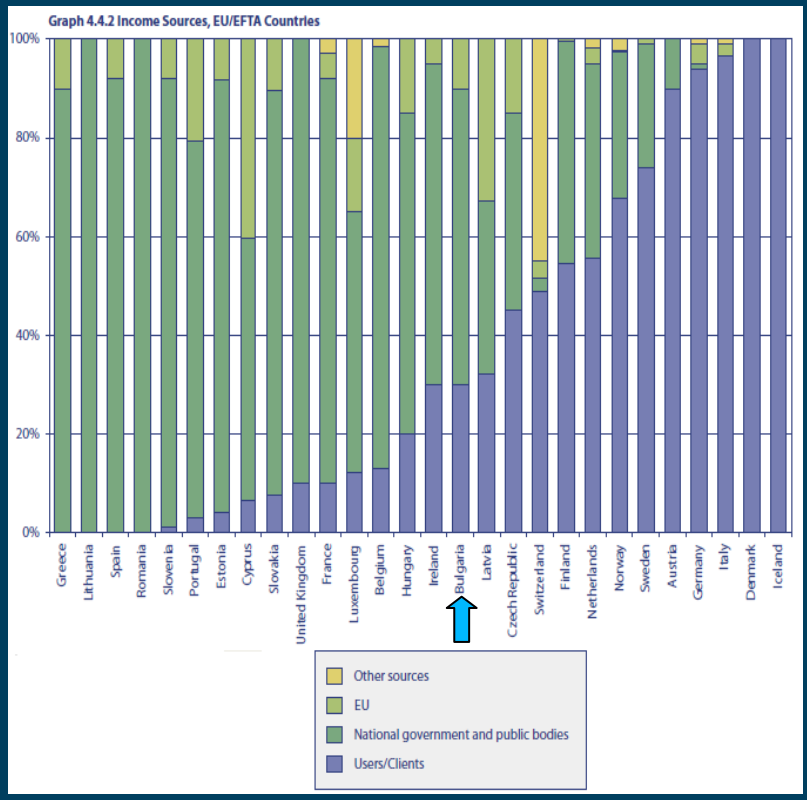

Общ бюджет за 2004 и 2008г.

Източници на финансиране

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- DANTE

www.dante.net

– Manages GEANT infrastructure
– Manages GEANT Network Operating Center
– only 15 NRENs out of 30 are shareholders in DANTE

TERENA www.terena.org

The European association of research and education networking organisations

Supports the the co-ordination of research and development activities, both among project partners, and between the project and other technical development initiatives that are directly relevant to research and education networking.

TERENA task forces receive EC funding as part of GÉANT2, and will continue to foster new ideas that may give rise to new GÉANT2 research activities.

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GÉANT2 Goals

- Provide a gigabit-speeds infrastructure to support European research and education
- Provide a research infrastructure for network technology developments
- Develop a wider range of network services via **The GÉANT2 Joint Research Programme**
  - Performance monitoring (JRA1)
  - Security (JRA2)
  - Bandwidth on demand (JRA3)
  - Testbed facility (JRA4)
  - AA infrastructure, Mobility and Roaming (JRA5)
- Provide global connectivity for Europe's research and education community

The GÉANT2 Joint Research Programme

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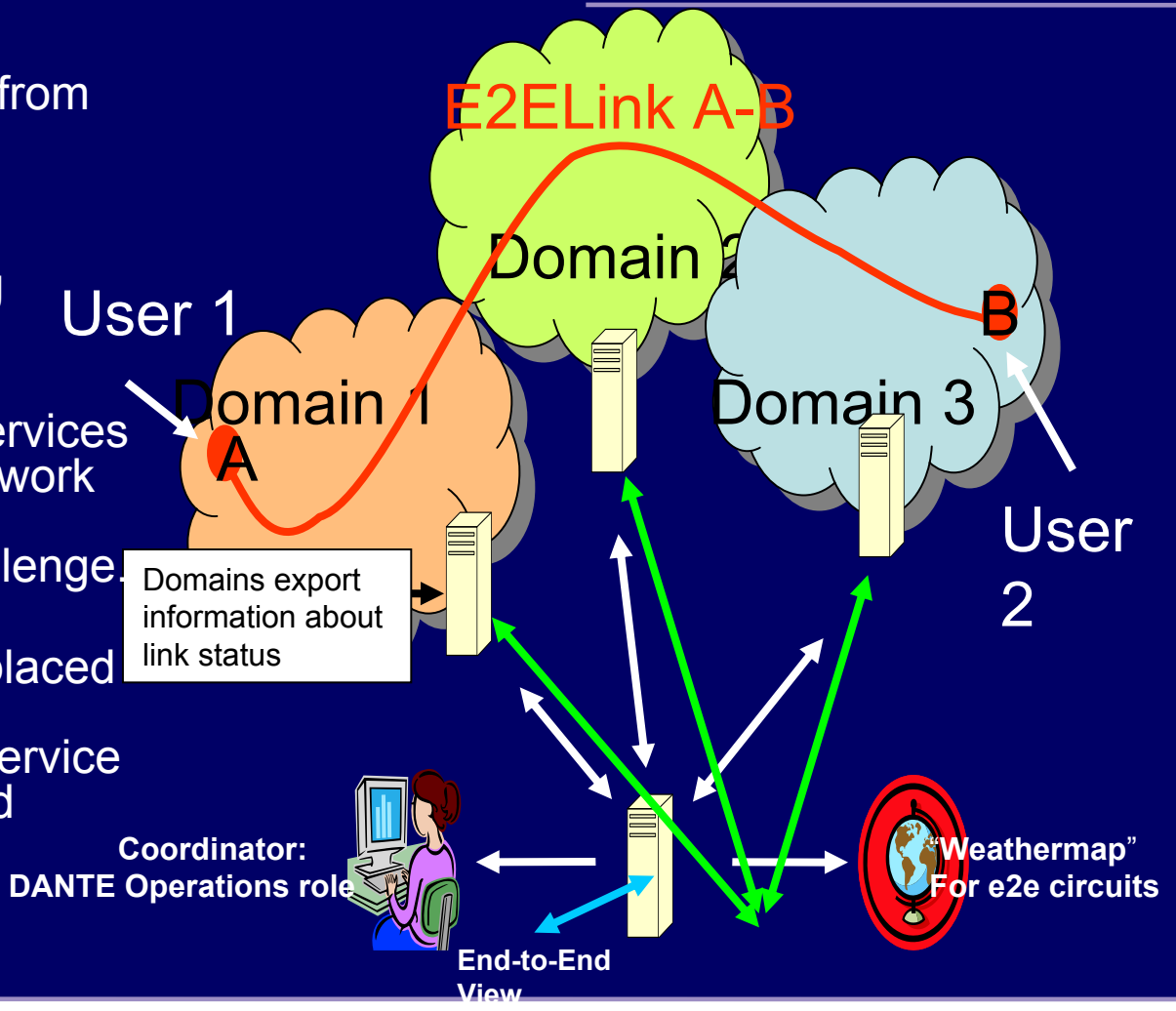
Programme of research and development initiatives
new networking technologies from concept to production service

The structure aims to foster a culture of co-operation among Europe's NRENs.

The extension of advanced services beyond the GÉANT2 core network will be a particular source of technical and operational challenge.

Specific emphasis has been placed on developing an end-to-end approach to the provision of service across multiple interconnected networks.



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Performance Measurement and Monitoring

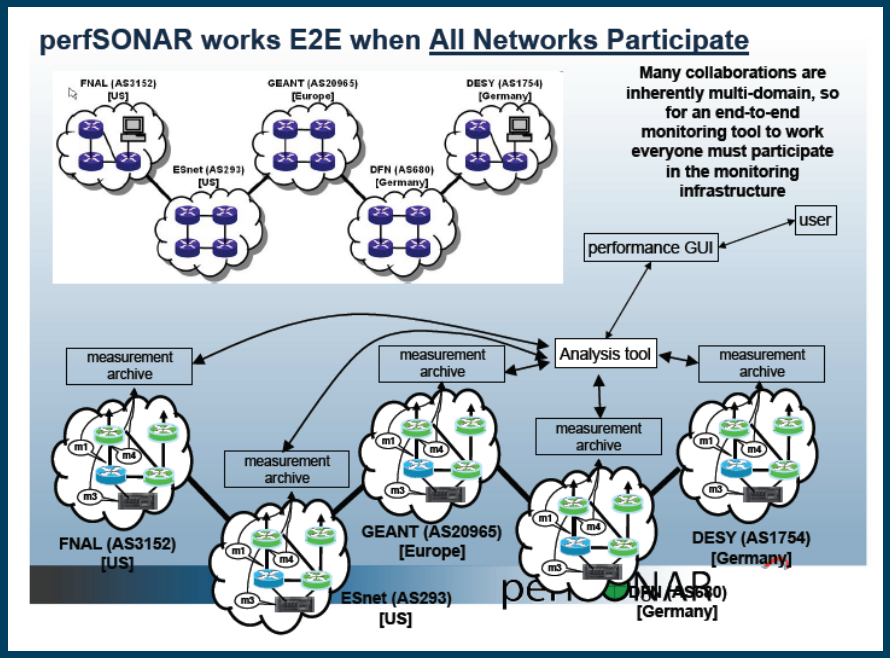
- Wide range of tools for monitoring the status of their network infrastructure
- The methods used for collecting and analysing data vary widely between networks.
- In any single international path between two end points, at least five networks are involved:

Two university or campus networks

Two national backbones (the participating NRENs)

The European backbone (GÉANT or GÉANT2).

- An incident that disrupts the data flow could occur anywhere in these five domains, and as a result, can currently be extremely difficult to identify and remedy.
-



The need for Multi-domain Monitoring

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- Observations
  - e2e troubleshooting is not straightforward
    - End system vs. network based problem
    - Don’t want to spend too much time when the problem isn't on your network
  - IP e2e doesn’t stop at the boundaries of a domain
    - Monitoring is done “locally” to your network
- Examples: Video-conference, high data rate transfer.
- Network researchers needs network information
- The end-users currently don’t have any or very little view about the networks
- Visualisation currently dictated either by the tool or the data provider
- Facilitate the retrieval of monitoring information from multiple administrative domains.

PerfSONAR (GEANT 2, ESnet, Internet 2 and RNP)

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- **perfSONAR is a software**

Wraps around existing measurement tools & data stores

Helps in exporting measurement data

- **perfSONAR is an infrastructure**

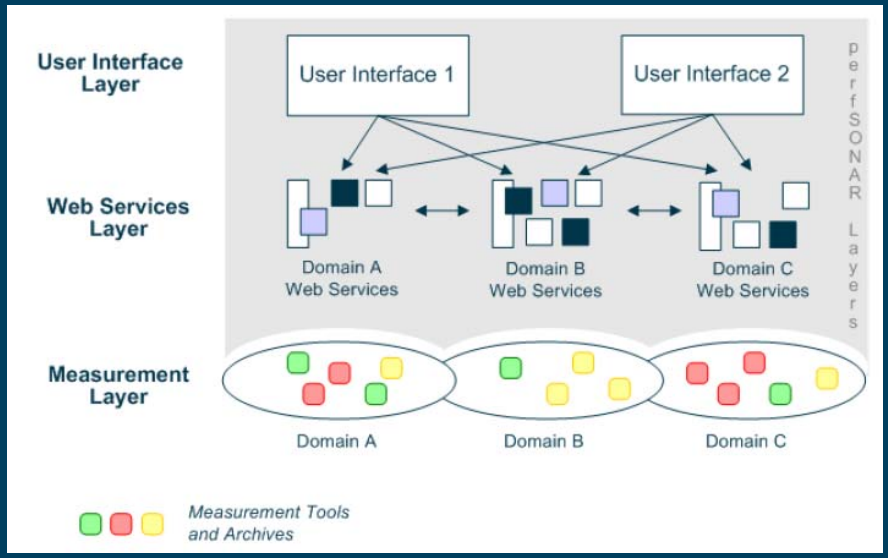
Provides a set of services (software)

Help in locating data, making measurements, retrieving data, authentication & authorisation of users

Provide seamless access to multi-domain data

- **perfSONAR provides a framework**

Many types of measurement tools & data stores are in use today



The perfSONAR MDM service enables users to:

• Access network metrics for their own or any other network in the European NREN. The metrics have a universally consistent meaning within the entire European NREN.

• Perform network measurements in different networks.

PerfSONAR measurement layer

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The Measurement Layer of a domain consists of the

- Measurement Tools

Examples:, BWCTL, Cricket and MRTG, thrulay

- Measurement Archives

Examples: Hades, SQL and RRD MA

that are deployed within the domain.

Example metrics of interest:

- Link utilization
- One-way delay and its variation (aka jitter)
- Round trip time and its variation
- Packet loss
- Interface errors and drops

The perfSONAR web services in the Web Service layer wrap the measurement layer's measurement tools and archives, so that relevant network performance information can be exchanged between domains. Domains can thus create customised domain controls with maximum flexibility.

Locations of deployed RRD Measurement Archives and IPPM Measurement Points

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perfSONAR

perfSONAR system: User group requirements

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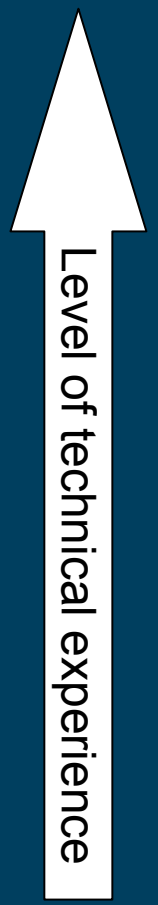
- NOC/PERT (Performance Emergency Response Team) staff
  - Detailed metric information for troubleshooting
  - Possibility to trigger additional active tests
- Project members (e.g. EGEE project)
  - Visualization of project network with specific views and metrics
- End users
  - Meaningful application performance metrics
- Administrative/non-technical staff
  - Overview functionality



PerfSONAR visualisation

http://perfsonar.acad.bg

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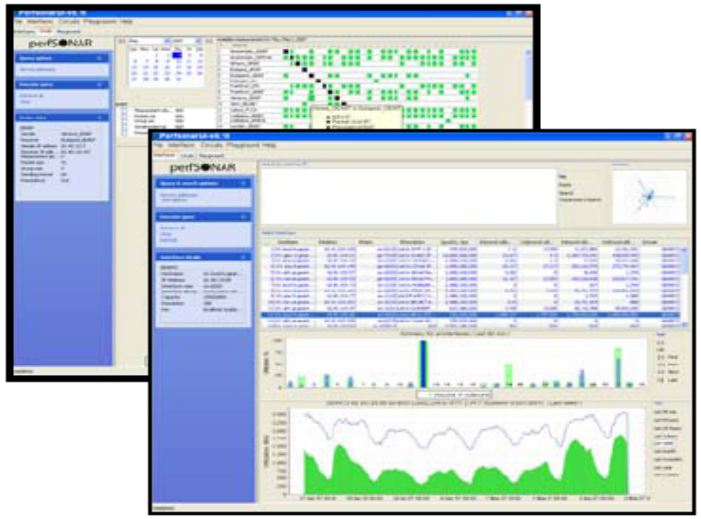
perfsonarUI

perfSONAR UI is a Java application that makes network management and performance information from a range of perfSONAR services easily available. Retrieving data from RRD, SQL and Hades Measurement Archive web services as well as SSH / Telnet Measurement Point web services, it provides:



- A utilisation summary for all selected interfaces in tabular and graphical form.
- On-demand TCP throughput tests.
- Visualisation of utilisation details for a chosen interface and a selected time period.
- Graphs, charts, diagrams and figures that represent:
  - One-way delay between measurement points.
  - IP Delay Variation between measurement points.
  - Packet loss between measurement points.
- A Looking glass for retrieving information from network devices in real-time (for example, traceroute, BGP table).

perfSONAR UI is a useful tool for end-users with a basic technical background, NOC staff, PERT staff and projects with demanding network performance requirements.

http://www.geant2.net/upload/pdf/PB_perfSONAR_MDM_3.0_20080125103826.pdf

PerfSONAR UI

(http://perfsonar.acad.bg)

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- Open source (GPL)
- Standalone and Java Web Start application, consuming perfSONAR Web Services
- Development started at ISTF (BG) Dec 2005 (Nina Jeliazkova, Vedrin Jeliazkov, Luchesar Iliev)
- First demo on GEANT Technical Workshop January 2006
- Most popular client for accessing perfSONAR web services
- Flexible plugin architecture designed and supported by the BG team; several developers over the world had later developed or are working on different perfsonarUI plugins (BE, DE, USA, NL, Serbia)
- Hands-on training and tutorials

  http://www.geant2.net/server/show/ConWebDoc.2767
- An interview about our contribution to perfSONAR (2007)

  http://www.geant2.net/server/show/conWebDoc.2513

perfSONAR Multi Domain Monitoring Status Overview

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perfSONAR :: Status - Windows Internet Explorer

http://perfsonar.acad.bg/status/

perfSONAR :: Status

SHOWING ALL SERVICES (click to toggle)

Last updated on Wed Sep 26 10:31:01 UTC 2007

MDM			
SERVICE	ICMP	HTTP	PRFS
ACAD/BREN RRD MA (Java)	✓	✓	✓
ACAD/BREN RRD MA (Python)	✓	✓	✗
CARNet RRD MA	✓	✗	✗
Cesnet RRD MA	✓	✓	✗
ESnet RRD MA	✓	✓	✗
Fermilab RRD MA	✓	✗	✗
GARR RRD MA	✓	✓	✓
GEANT2 RRD MA	✓	✓	✓
GRNET RRD MA	✓	✓	✗
MREN RRD MA	⚠	✓	✗
PIONIER RRD MA	⚠	✓	⚠
RedCLARA RRD MA	✓	✗	✗
RENATER RRD MA	✓	✓	✓
RNP RRD MA	✓	✓	✓

MDM			
SERVICE	ICMP	HTTP	PRFS
SEEREN RRD MA	✓	✓	✗
SURFnet RRD MA	✓	✓	✗
SWITCH RRD MA	✓	✓	✓
Uninett RRD MA	✓	✓	✓
DFN-Labor HADES MA	✓	✓	✓
ACAD/BREN LS	✓	✓	✗
PIONIER LS	⚠	✓	✓
RNP LS	✓	✓	✗
SWITCH LS	✓	✓	✓

LEGEND	
Packet Loss = 0%	✓
0% < Packet Loss < 100%	⚠
Packet Loss = 100%	✗
No data available	⛔

Service

ICMP Echo Request

HTTP GET request

perfSONAR EchoRequest

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Network Security

- The first GÉANT network made significant advances in the field of network security. During its lifetime, procedures and tools for detecting, preventing and eliminating attempts to disrupt service to the research communities across Europe developed rapidly, to reach the current state-of-the-art implementation on GÉANT.
- In GÉANT2, new challenging objectives were set to equip the Pan-European network and the NREN networks with the capability to be more proactive in incident handling and to provide much stronger co-operation. This is needed above all to provide an *end-to-end view to security* in the GÉANT2 environment.
- These goals have been pursued through the development and installation of numerous support tools, ranging from monitoring routing information to flow analysis to help identify attacks, track down the source of attacks, and provide pro-active counter measures.
- While GÉANT2 continues to focus on the security of access networks, it additionally pays attention to intervention on the backbone ones to assist systems security experts better protect users from network attacks.

Securing GN2 network elements and services

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- In the GN2 network, elements such as active and passive measurement devices (example systems are RIPE NCC TTMs, IPPM, OWAMP etc) and switching equipment are deployed in support of the new services together with conventional routing and switching equipment.
- Therefore, mechanisms to protect all these devices from malicious attacks, or even prevent abuse had to be put in place.
- Further, a GN2-wide common approach has been required as the new services have an end-to-end element, and, therefore, require compatible equipment and strategies to be deployed throughout the GN2 network.
- Two focal points best describe this activity:
  - Development of recommendations, policies, and best practice rules for GN2, NREN networks and regional networks
  - Their implementation on GN2 network and interfaces to NRENS
- The functions of Authentication and Authorisation have also been substantial in this activity as the data from the measurement devices had to be accessed only by users who had been duly authorised and authenticated.

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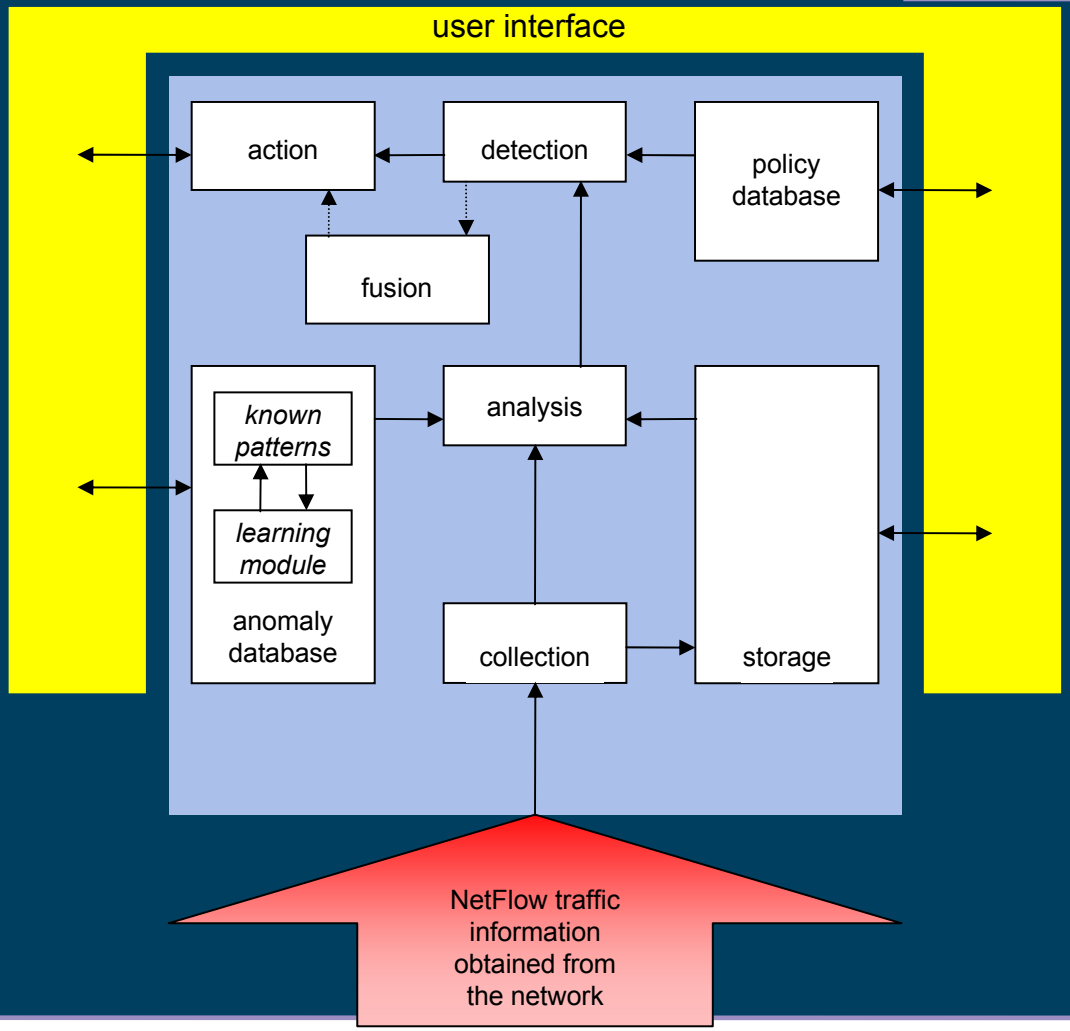
Building of security services

- Tools that monitor the active status of networks
  - monitor the traffic through active components
  - monitoring data that can be further analysed
- The existing tools and services
  - covered those aspects only partially
  - only for single management domains
- Innovative development efforts were clearly needed to extend the functionality and usability of existing tools and services with a particular view on multi management domain capabilities.
  - traffic patterns could be made visible by adequately analysing the resulting flow data.
  - specific patterns strongly indicating malicious traffic could be identified (detected and ascribed to specific sources) as easily.
- Even in the high capacity environment of research networks such as is the case in the GÉANT2 community,
  - the proper collection and analysis of flow data could be a powerful method to initially detect and subsequently respond to threats and attacks.
  - JRA2 community to undertake the development of a Toolset which would be capable of performing this task

Overall Toolset architecture



The Toolset Elements

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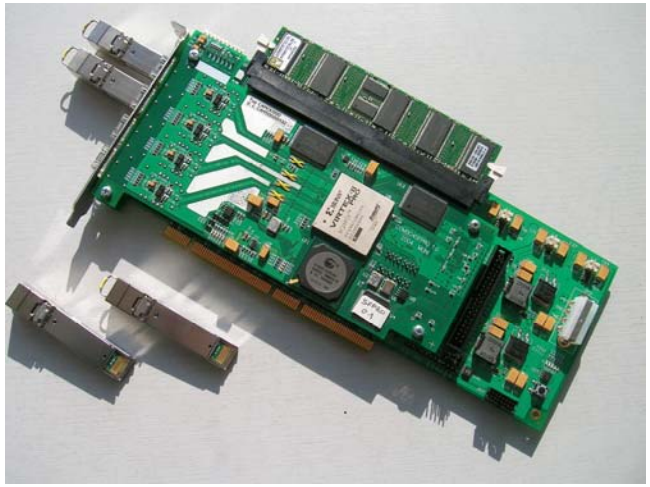
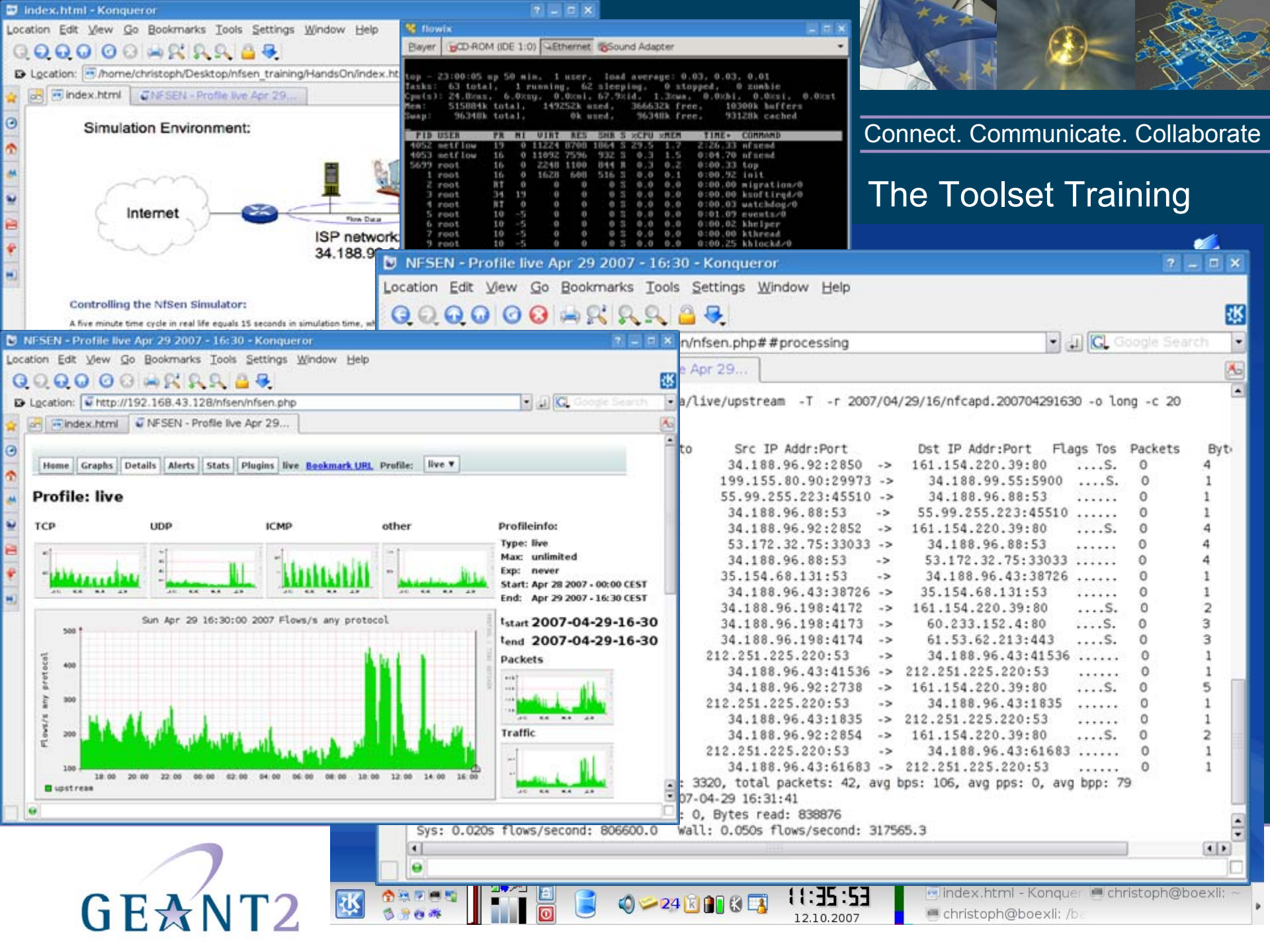
FlowMon probe



Netflow data

Nfsen analysis tool

Other Netflow sources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The Toolset Training
Simulation Environment:
Internet
Controlling the NfSen Simulator:
NFSEN - Profile live Apr 29 2007 - 16:30 - Konqueror
Location Edit View Go Bookmarks Tools Settings Window Help
Home Graphs Details Alerts Stats Plugins live Bookmark URL Profile: live
Profile: live
TCP
UDP
ICMP
other
Profileinfo:
Type: live
Max: unlimited
Exp: never
Start: Apr 28 2007 - 00:00 CEST
End: Apr 29 2007 - 16:30 CEST
tstart 2007-04-29-16-30
tend 2007-04-29-16-30
Packets
Traffic
Sun Apr 29 16:30:00 2007 Flows/s any protocol
Flows/s any protocol
upstrea
Src IP Addr:Port
Dst IP Addr:Port
Flags Tos Packets
Sys: 0.020s flows/second: 806600.0
Wall: 0.050s flows/second: 317565.3
11:35:53
12.10.2007
GEANT2

Operational relevance of the Toolset – an example

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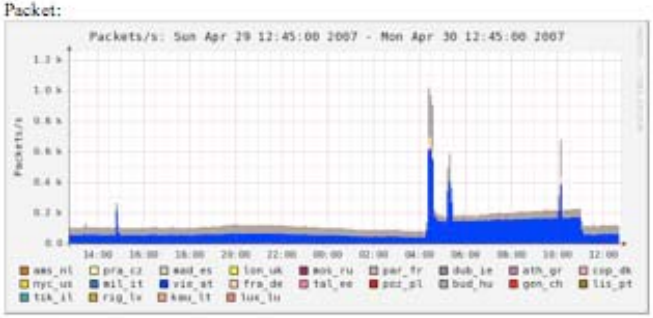
Excerpt from Dante internal Procedures OPS-04-065: Attack Filtering Procedures

Verifying the attack traffic

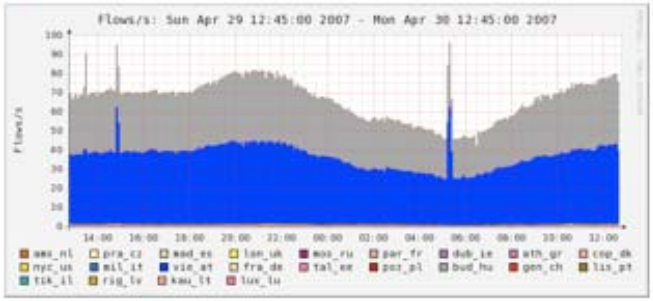
Using NfSen: http://[redacted]/nfsen.php
Select the profile relating to the NREN. For example with an attack directed at CARnet you should select the profile "to_CARNET-AS_hr"

Compare the graphs on the main page to determine whether the attack is either high packet or high flow. The spike should be evident as shown below:

Packet:



Flow:

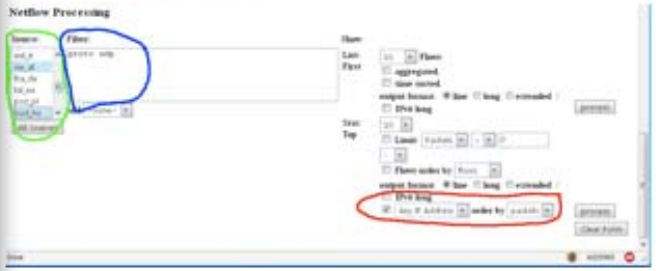


The next stage is to determine the protocol used.

Select either Flow or Packet in NfSen and then click details.
Again compare the graphs and the spike should be evident. In this case it was UDP traffic as you can see below:

It is also clear the majority of the traffic comes from Vienna and a little less from Budapest.
Using this information we can efficiently process the data as follows;

- On the graph, select the spike area and enter into the filter box (blue) "proto udp" or if the traffic is TCP enter "proto tcp"
- Select the Vienna and Budapest sources for analysis (green) and then tick the box shown in the red circle and make sure it says "Any IP address" and order is by packets or flows depending on whether this is a high packet or high flow attack.
- Click the process button (the one above the 'Clear Form' button) and wait for NfSen to analyse the data.



Netflow exporting appliance

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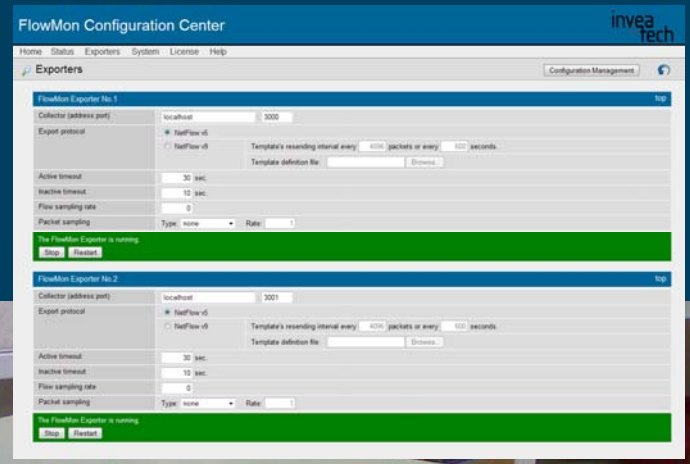
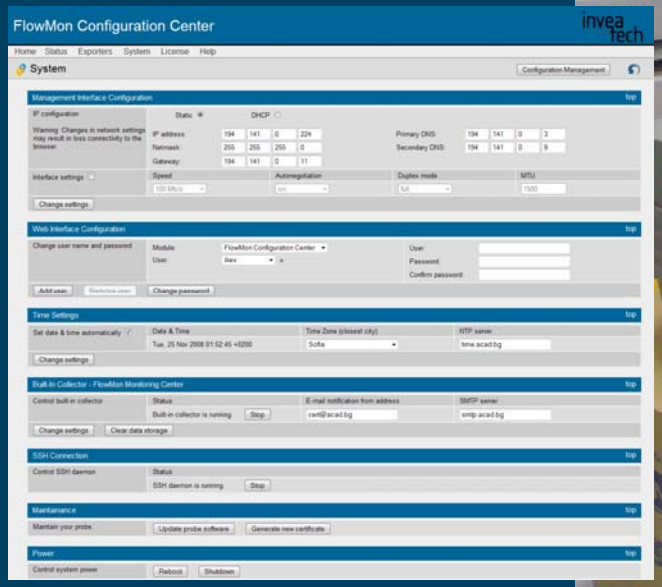
- Made by INVEA-TECH (a CESNET spin-off): http://www.invea-tech.com/
- Runs OpenSUSE
- Initially 1 Gb/s capability, upgrades to 10 Gb/s
- Copper or fibre connections





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Designing and establishing an infrastructure for co-coordinated security incident handling

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- Effectively protecting the GN2 network and its customer networks requires the capabilities to detect potentially problematic conditions and to react effectively. Depending on the type of threat, the proper place to detect anomalies is within the backbone of GN2, the participating NRENs or even within campuses interconnected by GN2. The same holds true for taking effective measures against those threats.
- The objective has been to create a platform to deploy the advanced security services with a special view on GN2 end users. The target has been set on building effective procedures to exchange information in a secure and trusted environment and on tools to present data on network incidents.
- Data on network incidents have been obtained from the suite of tools developed in the previously mentioned work item. Here the focus has been set on how to use them, what subset of data is meaningful to the CISRT teams who will use the data, and how the information can be used and exchanged.
- Trust cannot be mandated, but has been critical for the success of this activity. To promote it, agreed and clear rules in handling potentially sensitive information, defined expectations including timelines towards participants in dealing with requests are absolutely necessary. Therefore emphasis has been put on the establishment of such policies, rules and expectations to be followed within this trusted environment as well as in communication with external liaisons.

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Security Operations Scenario

- The security of a backbone depends heavily on the security of the networks connected to it, and this fundamental concept shall be iterated further, down to the single computers and networked objects that can reach the backbone. As a consequence, making the backbone secure includes a large number of people, each one with his/her own "security domain"; even the real end-users, like those using a Personal Computer or perhaps a VoIP telephone, are thus part of this scenario, too.
- For these reasons, coordination among different security domains is needed: vertically, at least from the NREN level down to each single end-user; but also horizontally, when you reach the inter-NREN relationships. The current hierarchical model has indeed proven to be very effective at national level, where many NRENs have established their own national Security Service (often called CSIRT or CERT). However, at GN2 backbone level, a horizontal approach – where NRENs' Security Services handle at peer multiple-partner-level incidents – seems to be more effective than a single centralized service.
- In fact, there is not a homogeneous situation among the different NRENs accessing GN2 backbone: there is a "security old core", where well-established security teams operate at the NREN level; but also many countries, where NRENs' Security Services are just starting to exist; and others, where there is still no security team operating at all. This situation makes the overall GN2 security a tricky process to supervise: e.g. in case a threat originates from an NREN, where there is nobody yet able to handle the problem locally, it becomes necessary to involve the GN2 Network Operation Centre in the process too.
- That is why it was substantial to bring up to speed those NRENs that were still lacking an internal security service, aside with the need to establish the horizontal coordination among the existing NRENs' security teams. The goal, thus, has been to fulfil both of these needs. In the first part of the project the "horizontal coordination problems" has been addressed, while later the activity additionally initiated actions to help setting in security operations where they were still missing.

Security operations hierarchy in GN2 and beyond

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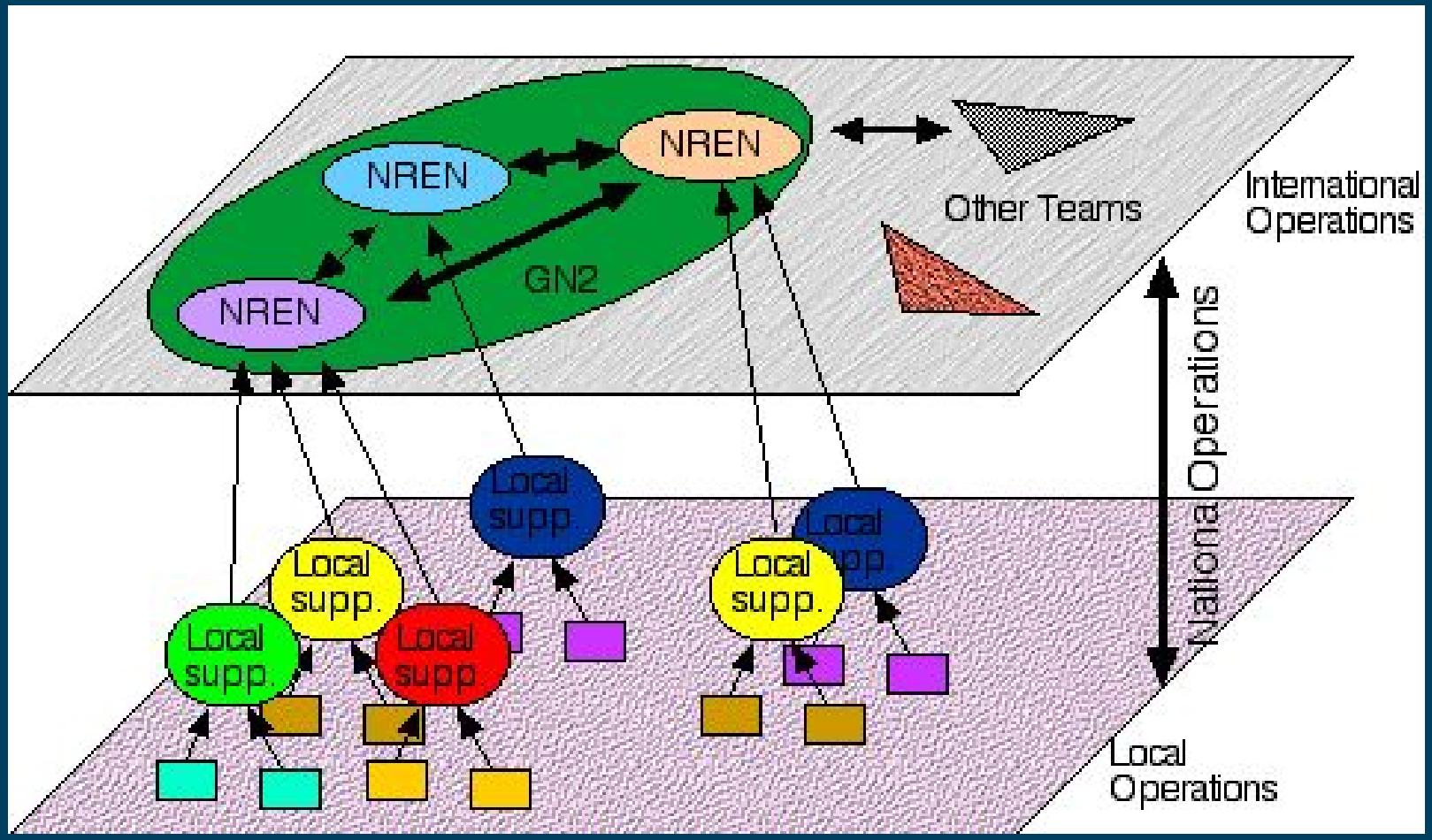

NREN National Security Operations

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- Security operations at the NREN level are usually coordinated by the NREN Security Team. The team is responsible for handling incidents, which originate from or affect users, machines, and/or services, connected to the NREN itself.
- The security team typically performs the following tasks:
  - receives incident notification by the downstream connected institutions and users;
  - receives incident notification by external sources (both other NRENs and non-NRENs);
  - maintains a trouble ticket system, which keeps information on incidents in their corresponding or assigned states;
  - in case an incident originates from one of the downstream connected institution/sites, the security team interacts with the security or network manager of the institution/site in question, providing information and advice on how to solve the incident; the handling procedure is often described in a formal document, which also gives information about incident severity classification, required response time and actions, escalation procedures, and actions in case the incident is not handled correctly locally;
  - interacts with the NREN's Network Operation Centre (NOC) in case filtering on the backbone and/or on the local access links is required to block an incident, until it is solved at the originating site;
  - in case the incident originates from another NREN or any other external organisation, the security team initiates contact with the appropriate peer security team, in order to have them start internally their own incident handling ticket(s) and procedures.
- Some security teams also provide additional services to their NREN community, like Security Alerts and proactive security network monitoring [CERT.ORG].

Pilot Phase 1

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- The main goal was to establish a framework where security operations can be done efficiently, quickly, and effectively among GN2 partners. In order to obtain this result, both a human and technical network had to be established, where involved elements are trained/prepared for their role, and are thus able to interact with the other elements in the best possible way.
- How and when serious security attacks may appear towards or within GN2 and its partners cannot be known in advance. The important fact is to be ready to react, stopping the problem, and even better – to be proactive – preventing the problem from happening at all. The coordination procedures, the tools, and the human relationships shall be there in place, tuned and tested, in order to achieve success.
- The list of possible items was drafted at the beginning of the Pilot Phase 1 as follows:
    - establish trusted communication channels between CSIRTs by exchanging electronic credentials (secure communications);
    - establish security incident level agreed classification (severity level);
    - define a default response time, depending on severity level;
    - define information handling procedures, covering the information exchange within the GN2 community as well as with liaisons outside GN2;
    - create coordination procedures with network operation teams and LAN management teams, defining responsibilities and actions;
    - create an alert announcement mailing list including CSIRT people;
    - deploy automated incident alarm systems and information exchange (IODEF and similar), built upon the results of eCSIRT.net project [eCSIRT] and similar activities (SMS out of band…);
    - establish a common trouble ticket system;
    - give recommendations to service developers from the user's perspective;
    - agree/disagree on how to handle IPR related incidents.

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After the Pilot Phase 1

- The Pilot Phase 1 has proven that a different and more modular approach towards security handling coordination is needed at the international level among GN2 partners. In particular, there are some core requirements, which must be fulfilled by all participating teams, while a number of other activities are just recommended or useful optional add-ons.
- Another important result from the Pilot Phase 1 is the quite strong distinction which should be made between activities useful in “production” Security Operations and experimental or pure research activities which might become useful in the future, but are not yet ready for the real life. We thus propose a structuring which is divided into a “Service Activity”, including the basic activities required to create a GN2 safe operational environment, and “Advanced Activities”, which should continue the research part of the JRA2 Security Activity.
- The basic activities for the NREN Security Teams are listed into categories. A formal definition of MUST, SHOULD, and MAY is also described in RFC2119 [RFC2119].
    - “MUST” category lists activities which are essential and strictly compulsory for the teams participating in the GN2 Security Operations;
    - “SHOULD” category lists activities which are strongly recommended to the teams due to their usefulness; participation in the GN2 Security Operations is however possible even if not all of these activities are performed;
    - “MAY” category lists activities which are truly optional; they are regarded as useful add-ons that do not influence negatively the GN2 Security Operations if not performed.
- Finally, a list of proposed MUST, SHOULD, and MAY activities for continuation and the generation of a Service Activity (eventually, within GÉANT3) was produced with the results of Pilot Phase 1 in mind.

Building block architecture for a Security Service and Joint Research activity

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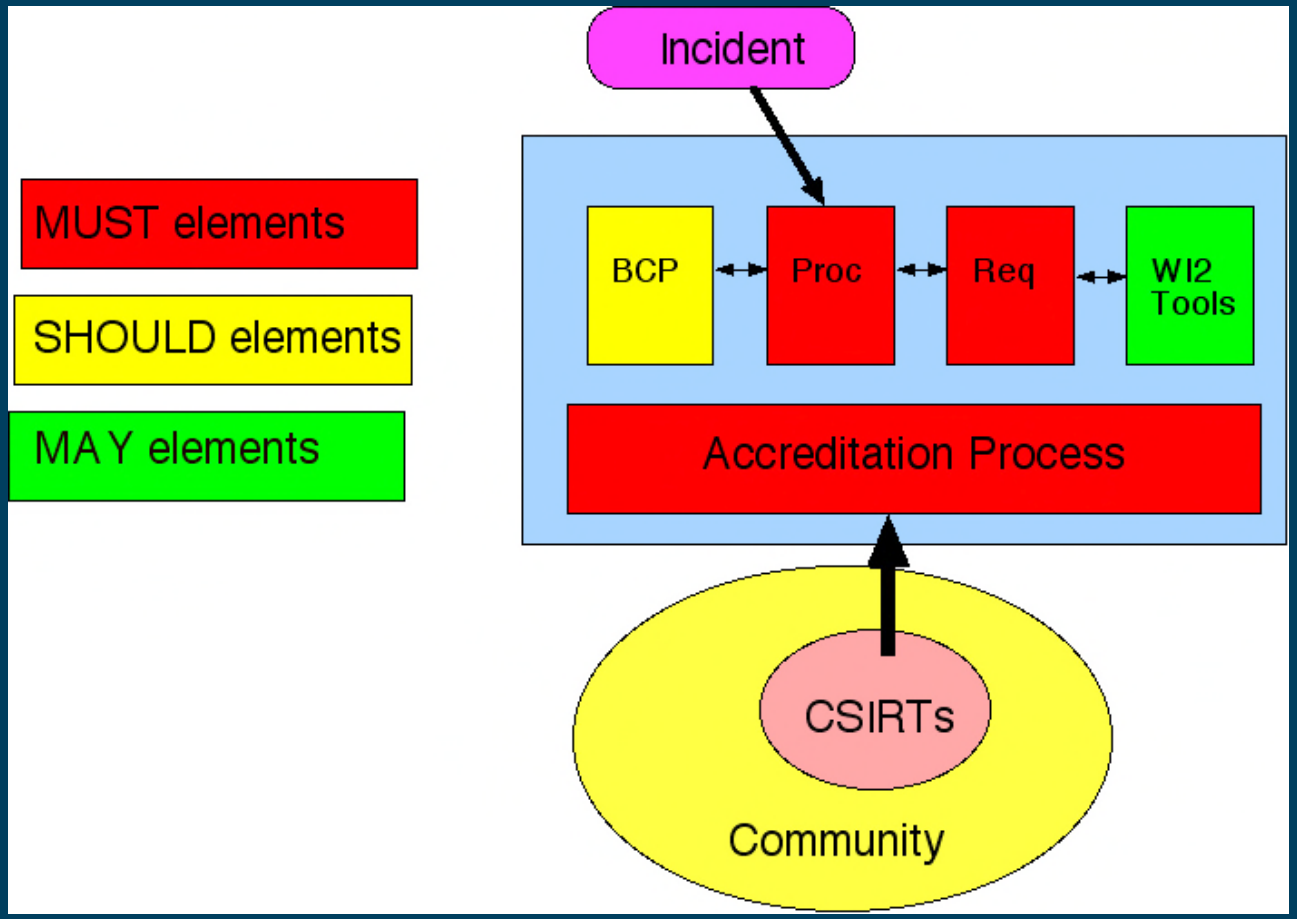

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CERT / CSIRT Establishment in ISTF / BREN

- As already mentioned, the security operations at the NREN level are coordinated by a Security Team.
- Within ISTF, the idea emerged as early as 2003, and by 2005 there has already been very strong commitment at tech level to support this activity, even if subject to the available human resources.
- In 2007, these efforts received important external support by entering into the so-called "mentoring" scheme within GÉANT2, where old and well-experienced security teams from GN2 provide help and advice to the newly-established ones.
- ISTF/BREN was honoured to be chosen as "trainee" by the security group doyen: the Swiss academic network SWITCH, and personally by the GN2 Security leader and head of SWITCH's Network Security Christoph Graf.
- By summer 2007 a comprehensive kick-off assessment has been performed by Christoph and Luchesar, and a starting roadmap has been set.
- Unfortunately, the ISTF to BREN transition complications effectively torpedoed the whole process.
- Only a year later, in 2008, BREN decided (after being "pushed“ by the partners) to build security team, yet totally anew, thus nullifying all progress made in the previous 5 years, further putting the whole implementation at risk due to potential technical and organizational issues.
- It must be well understood, that security is about trust. Therefore, it is extremely important, unlike in other, more "forgiving" areas, to keep the service continuity, and demonstrate stability and persistence.

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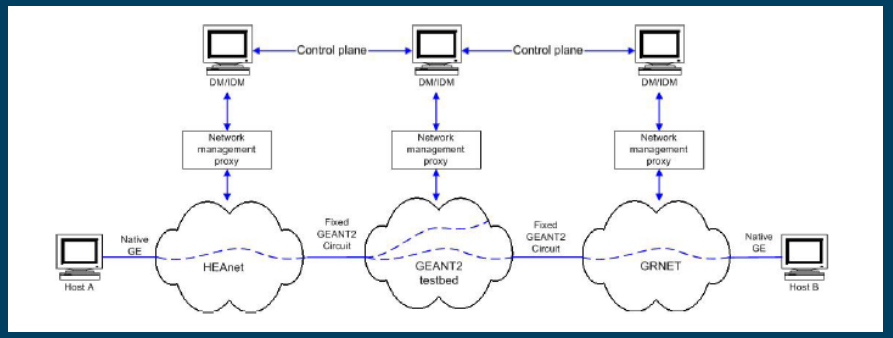
Bandwidth on Demand

- Design and implementation of a “Bandwidth-on-Demand (BoD)” service.
- This is an end-to-end, dedicated bandwidth service at the OSI Layer 2 or below that spans more than one administrative domains (multi-domain) and allows heterogeneous networking technologies to be used along the path followed by user traffic.
- The service will be provisioned dynamically; a user will be able to issue a request for a specific “pipe” and the network will provide it without or with limited human intervention.



AutoBAHN demonstration overview

Each domain runs one instance of the AutoBAHN Inter-Domain Manager (IDM). These are located on a server in each domain. The IDM communicates to the network management system in each domain via a network management (NM) proxy. The IDM to NM proxy interface is implemented using a standardised web services interface. This interface supports discovery of the domain’s network architecture and topology. It also supports request and confirmation messages for circuit creation within each domain.

Technology and Service Testing

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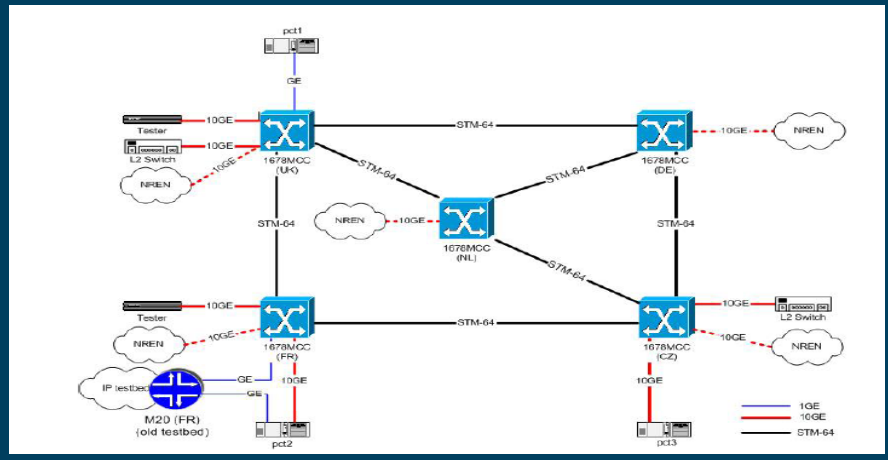
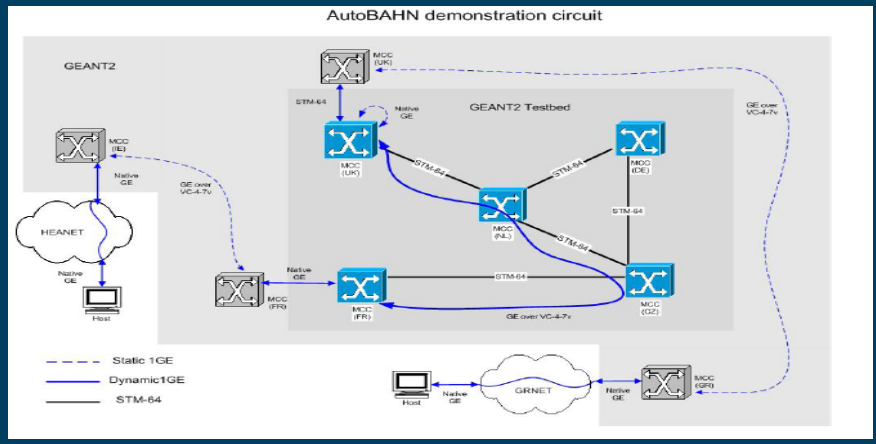
- The Technology and Service Testing research activity provides a distributed testbed to accommodate the methodical testing of the technologies and techniques developed by the GÉANT2 research programme.
  - Dedicated test facility
  - Gigabit IP routers and switches
  - Appropriate DWDM transmission equipment
- Provides an environment for testing the technologies that will be used as building blocks for the implementation of the next-generation network architecture.
- The test facility is primarily intended for the use of research activities and network development within GÉANT2. However, it is possible that the facility may also be made available to external users (dependent on availability). In particular, the test facility may be able to offer support to other projects that fall within the scope of the EU's Sixth Framework Programme.





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Roaming and Authorisation (eduroam, edugain)

- interoperable access to the networks that interconnect to form the research networking supply chain in Europe.
- To the user, the multiple networks must appear to be one seamless resource. A researcher visiting a collaborator in Paris should be able to log on to the network and access the local resources on his computer in Poznan easily.
- The activity has grown out of the work carried out by the TERENA task forces TF-AACE (Authentication and Authorisation Collaboration for Europe) and TF-Mobility.
- The main tasks at the beginning of the activity are to define, prototype and then build a roaming infrastructure, and an authentication and authorisation infrastructure (AAI). Once this infrastructure has been successfully established, the activity investigates the integration of both these more dedicated solutions into one infrastructure.

http://eduroam.acad.bg

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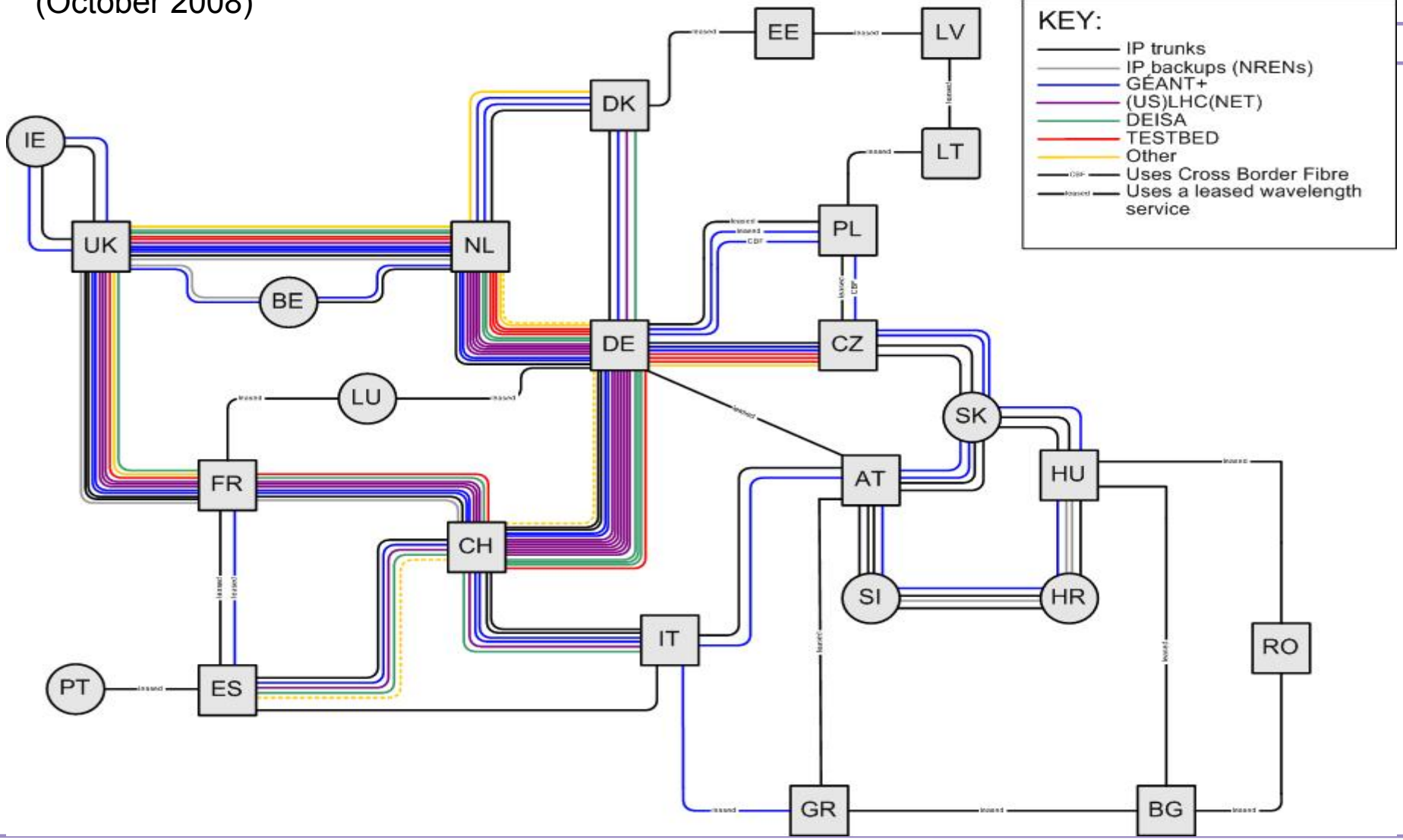
GÉANT2 Network Development

GÉANT2

NREN YEARLY MEETING, 25-26.11.2008
Hotel “Hisar”, Hisar

Wavelength summary

(October 2008)



Център за управление на опорната мрежа на GEANT (Cambridge, UK)

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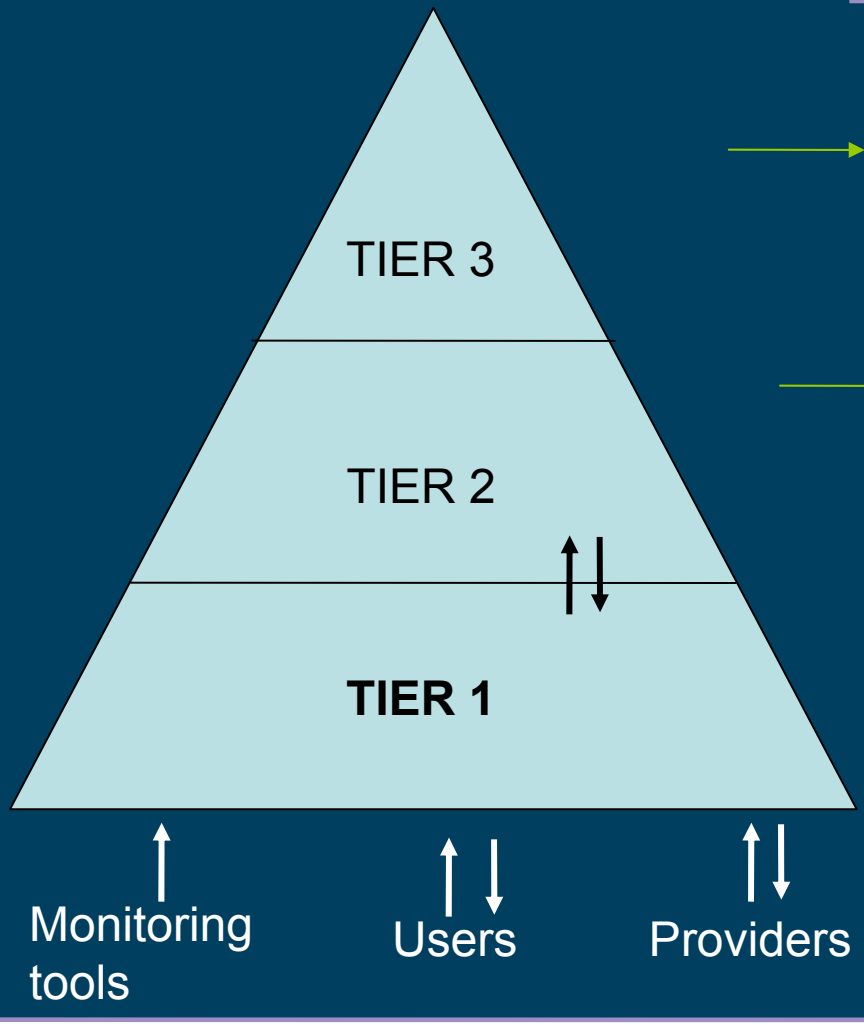
Complexity of tasks



In-source

09:00-17:30 UK time
1 shift of 2

In-source

05:00-21:00 UK time
2 shifts of 3

Out-source

this is economic

Connectivity Development (excerpt, Oct 2008)

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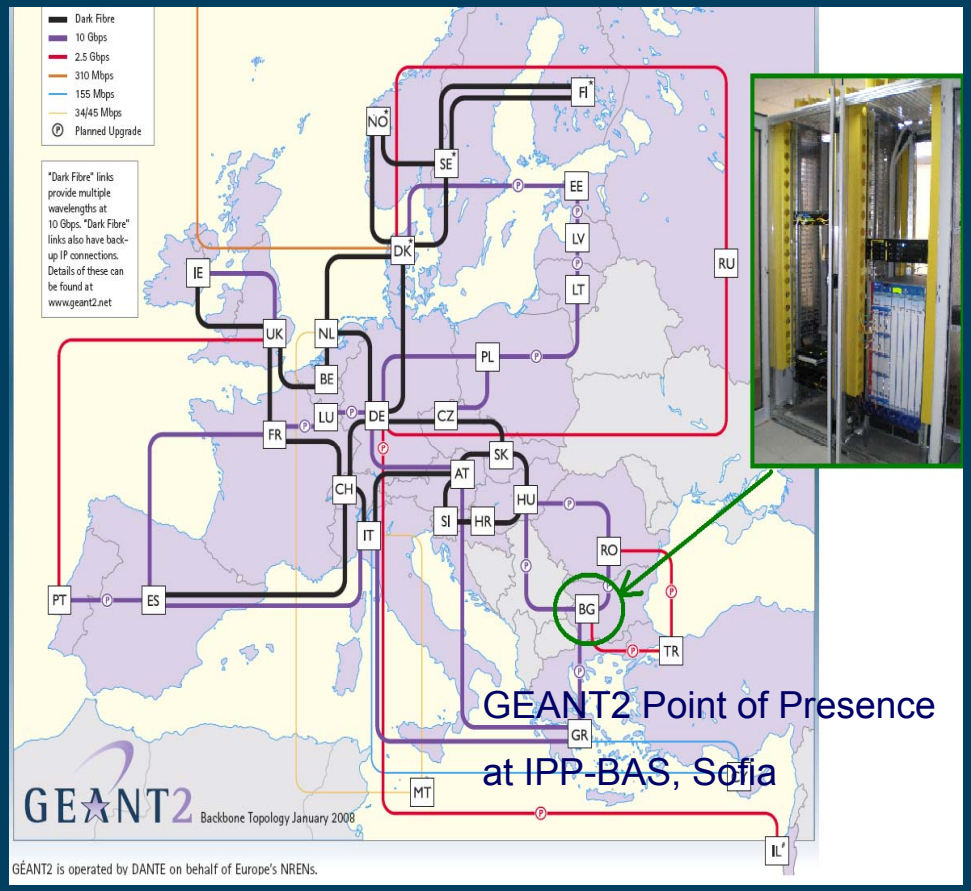
- South & East Europe
  - RO-BG, HU-BG, HU-RO in production
  - Including BREN and ROEDUNET accesses
  - 2 STM-16 accesses ready for TR, one in operation
  - TR backup still on STM-4 to HU



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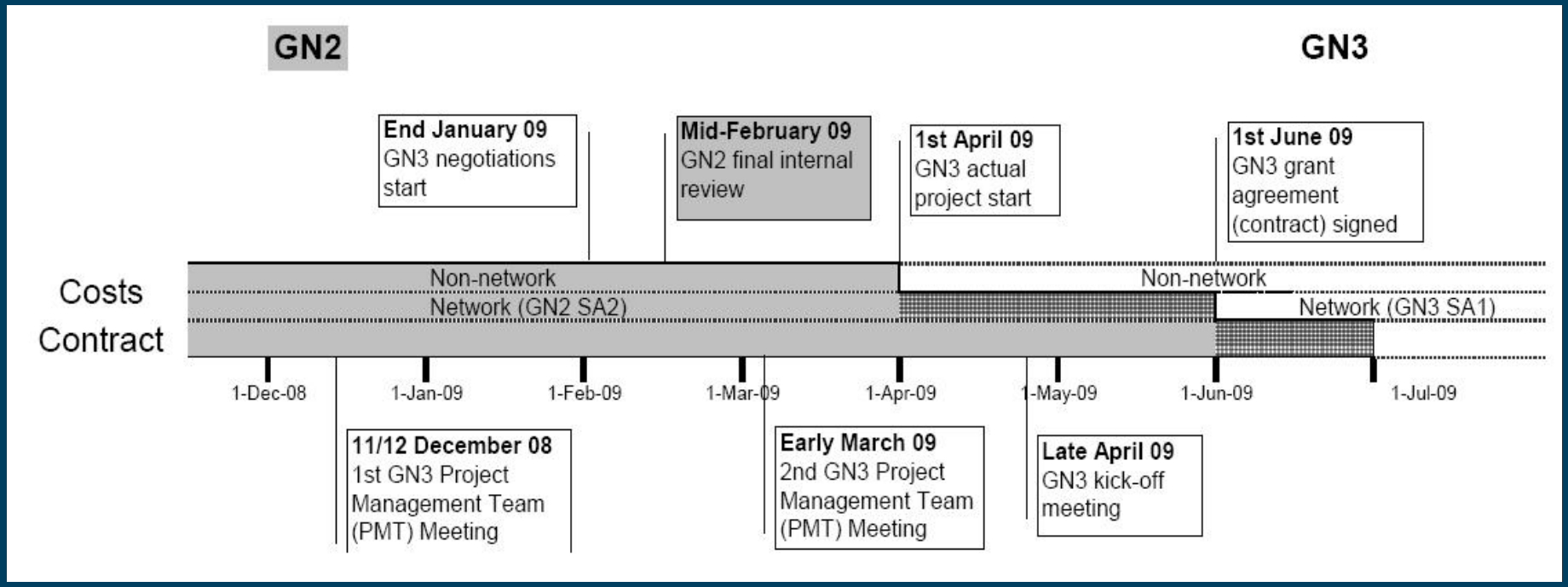
GEANT3 Proposal

Proposal prepared during spring and summer 2008

Submitted to EC 9 Sep 2008

Proposal hearing 10 November 2008



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GN3 Goals

- **Expand Reach**
  - Include new partners in South Eastern Europe
  - Associate and Cooperate with Eastern Europe partners
  - Approach equal conditions in the ERA
- **Widen user base**
  - Life sciences, space, fusion ITER, weather, PRACE, earth observation , emerging users

GN3 Goals (2)

- **Create a dependable network infrastructure** as one component of the EC e-Infrastructure
- Redesign backbone architecture, reevaluate concept
- Reduce common cost
- Increase the area where transmission wavelength is abundant at low cost
- Improve/rationalize global connectivity
- Global outreach of dedicated e2e services

GN3 Goals (3)

- **Develop multi-domain connectivity services**
  - Operable, measurable, secure, flexible, performant
  - Circuit/Ligthpath, Lambda, OPN, VPN, MPLS-cloud, managed network
- **Develop/enable roaming and AA services for individuals**

Basic Ideas of the Proposal

- Emphasis on multi-domain service
- The innovation is in the services
- Short term assignment of research tasks
- Justify “research” with a purpose
- Define clear service goals

- The relevant innovation is the innovation visible to the end-customer in R&E

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GN3 Work Packages

- SA1 GÉANT Backbone ← JRA1 Network of the Future
- **SA2** MD Ntwrk Service Operation ← JRA2 MD Resources & Services
- SA3 End User Services in Fed Env ← JRA3 Enabling Communities
- SA4 Software Governance

- NA2 Joint Dissemination & Outreach
- NA3 Status and Trends
- NA4 Liaison & Support

NA1 Management

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SA1 - GÉANT Network Architecture Design and Planning,

Procuring, Building and Operation

- Network Planning/Architecture study
- Procurement
- Provisioning and Operation

SA2
Multi-Domain Network Service Operations

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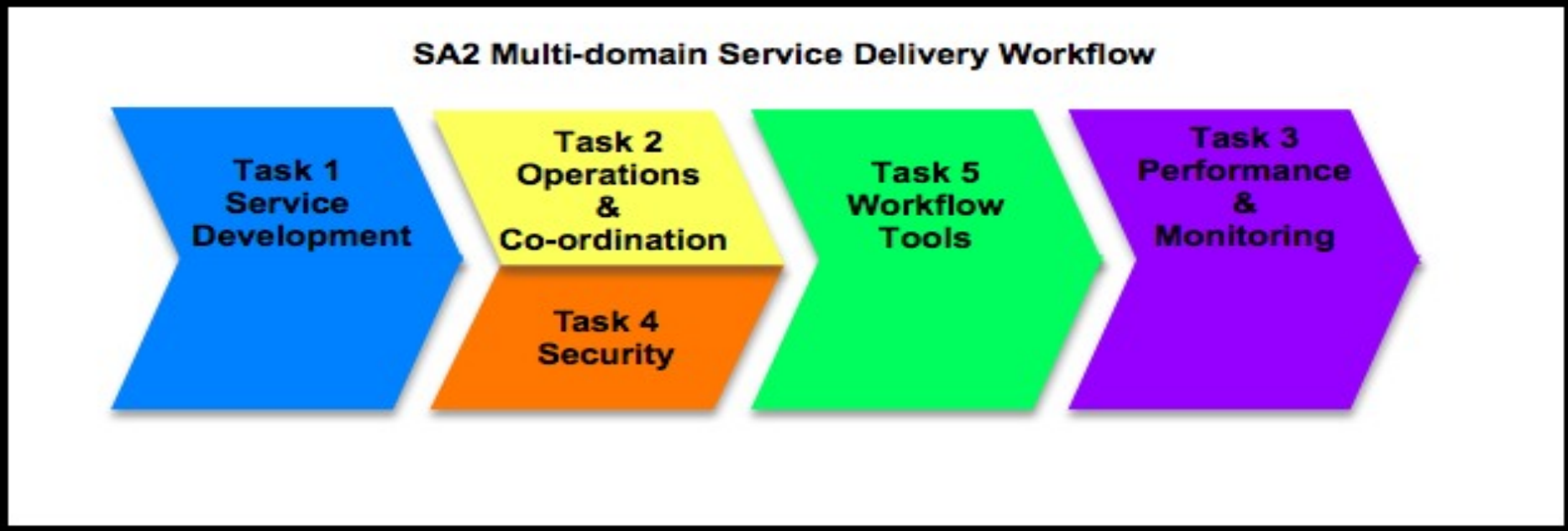

PERT, perfSONAR, cNIS, iSHARE, passive monitoring

SA3
End User Services In Federated Environment

- European PKI Coordination
- Operation of the eduRoam Confederation
- Development and Operation of VC Services
- Development and Operation of eduGAIN

SA4 - Software Governance

- Software Best Practice
  - policies for SAs (and JRAs)
- Quality Assurance
- Development and Support Infrastructure

NB: Development and Maintenance of code is done in the other SAs (and the JRAs where applicable)

GN3 Services

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GN3 Budget overview

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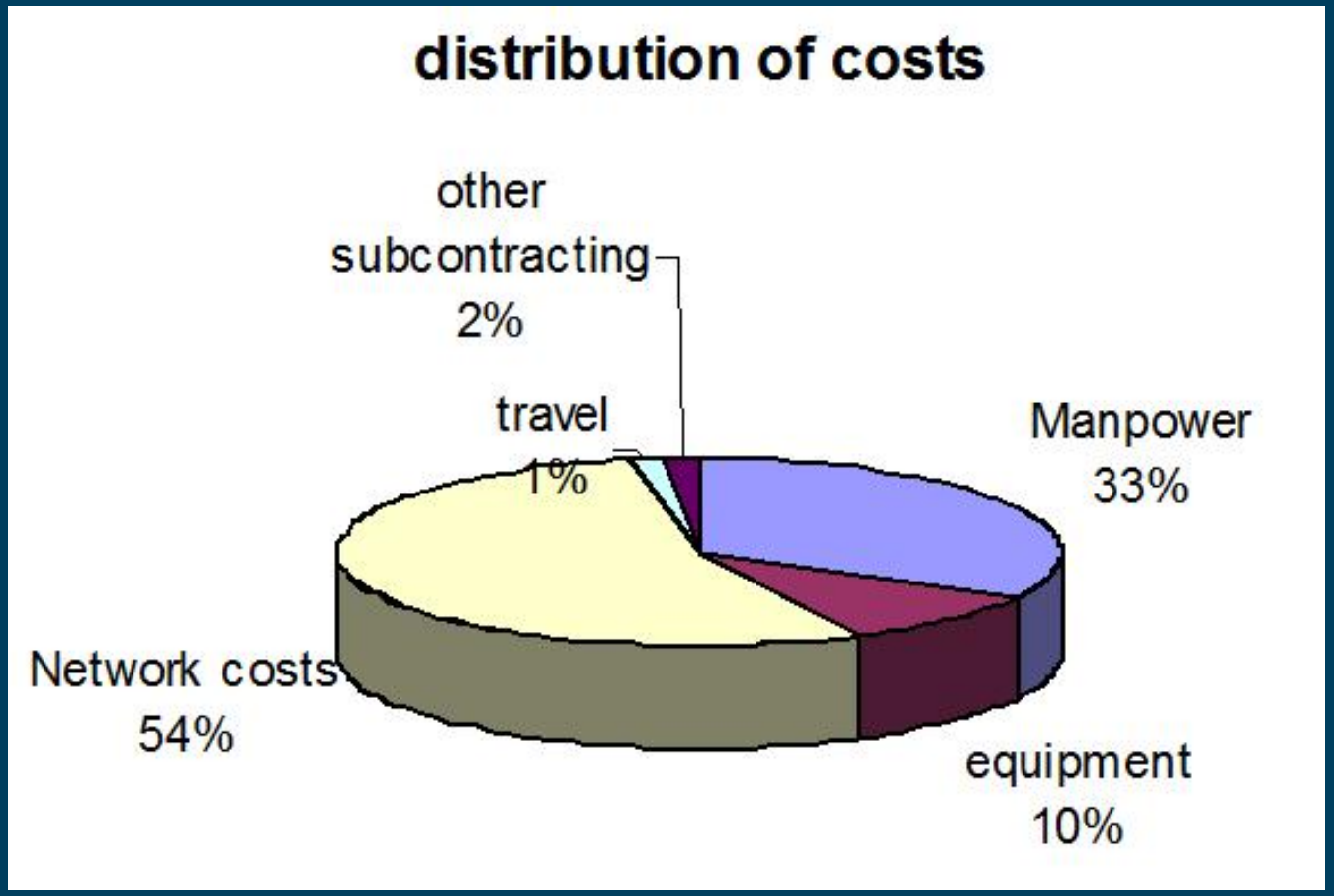
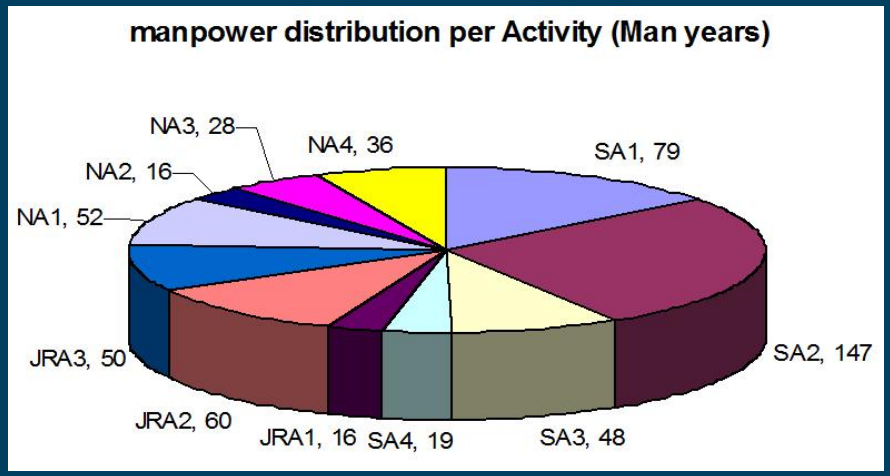


GN3 Manpower

- Manpower effort was heavily over subscribed in some activities compared to original proposed effort; some areas were under-subscribed
- Targets set per activity that reduced effort to the lower of
  - What was originally planned
  - What was offered
- New manpower forms submitted by Partners
- Activity leaders then made final reductions to meet targets



БИОМ / BREN effort in person months

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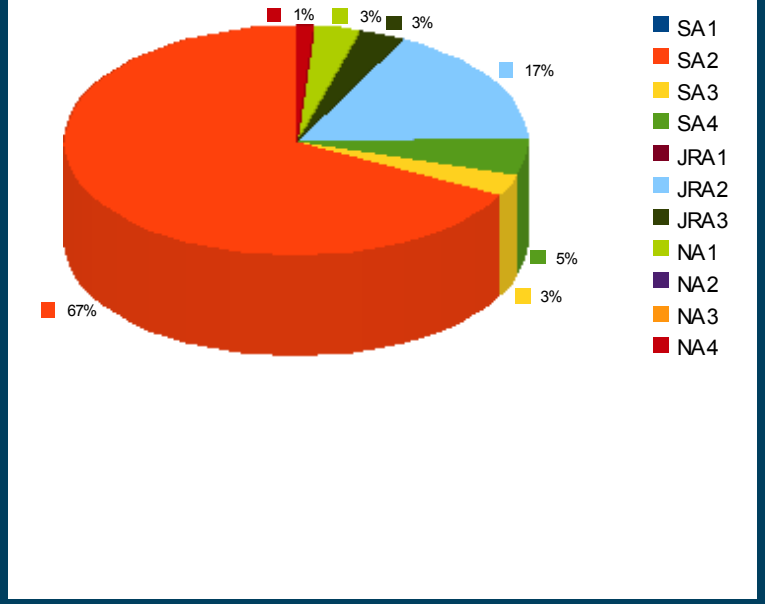
SA1	Network architecture planning,Procurement,Network operation
SA2	MDN Service devt,Service coord & operations,Service monitoring Tools,Security,Tools to support MD workflows
SA3	Co-ord EU PKI,Operation of eduroam federation,Video conferencing, EduGAIN
SA4	Software best practice,QA,Devt support
SA Total	
JRA1	Core Network Technologies,ROADMS,Photonics,Federated Network architectures,Virtualisation,Advanced Network contro
JRA2	Control and management,Hybird Network provisioning,Monitoring,Security,Network Factory
JRA3	Roaming Developments,Identity Federations,Composable Network Services
JRA Total	
NA1	project management
NA2	Strategy,planning,branding&messaging,Partner service promotion,Web based comms,Materials,Press & News,External ev
NA3	NREN Compendium,Task force Co-ord,Foresight update,Campus Best practice,Study of evironmental impact
NA4	International co-operation,Internal co-operation,Projects liaison,Liaison with standards bodies and industry,Development as
NA Total	
Total	



Human resources per partner

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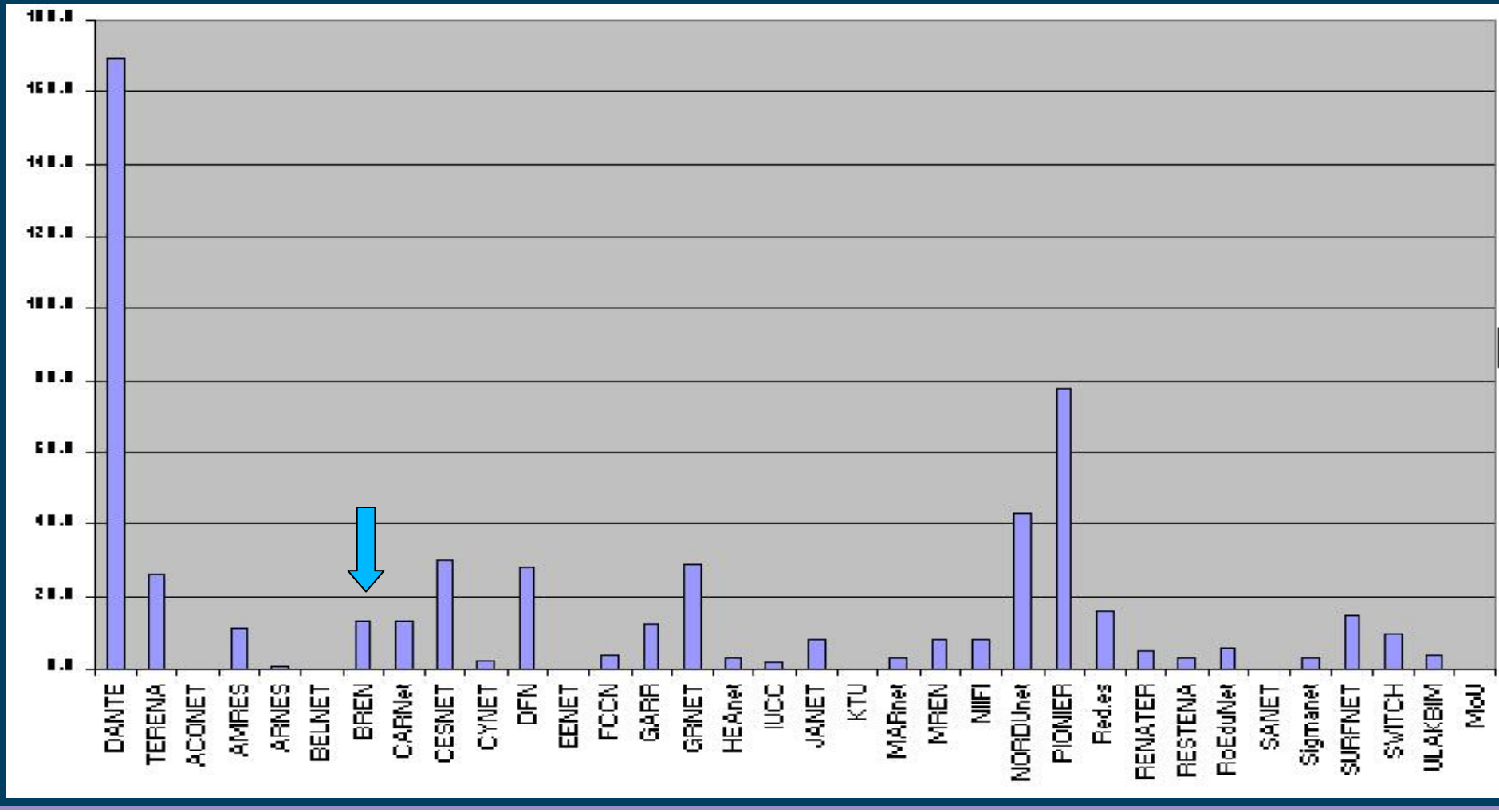

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Изводи

GEANT2

- Високоскоростна оптична инфраструктура в Европа
- Предоставяне и развитие на услуги, които надхвърлят рамките на дадена организация
- Федеративен принцип

GEANT3

- Еволюционен подход за развитието на мрежовата инфраструктура
- Продължение на работата по изследователските тематики от GEANT2
- Предоставяне на услуги, разработени през GEANT2

България

БИОМ / НИОМ / НИМ / ПРООН/ ФТИО / ДАИТС / ИПОИ / …

http://bren.acad.bg създаден 2006

http://www.nren-bg.eu/ създаден 2008

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Благодаря за вниманието!

Въпроси?