034115

PHOSPHORUS

Lambda User Controlled Infrastructure for European Research

Integrated Project

Strategic objective:
Research Networking Testbeds

Deliverable reference number D.7.3.1

Co-operation agreements with EU NRENs and projects

Due date of deliverable: 2009-06-30
Actual submission date: 2009-06-30
Document code: Phosphorus-WP7-D.7.3.1

Start date of project:
October 1, 2006

Duration:
33 Months

Revision 4

Organisation name of lead contractor for this deliverable:
PSNC

Project co-funded by the European Commission within the Sixth Framework Programme (2002-2006)		
Dissemination Level		
PU	Public	PU
PP	Restricted to other programme participants (including the Commission	
RE	Restricted to a group specified by the consortium (including the Commission	
CO	Confidential, only for members of the consortium (including the Commission Services)	

Abstract

The success of the PHOSPHORUS project depends on wide deployment of project results in National Research and Education Networks (NRENs) community particularly in EU and collaboration with other projects. It is crucial to organise the work and formal contacts with partners to exploit the knowledge of PHOSPHORUS. This deliverable reports the plans and efforts to disseminate and exploit the knowledge of PHOSPHORUS with NRENs and other projects.

This is the last release of an evolving deliverable document.

Project:	Phosphorus
Deliverable Number:	D.7.3.1
Date of Issue:	30/09/08
EC Contract No.:	034115
Document Code:	Phosphorus-WP7-D.7.3.1

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0 Executive Summary

This document describes co-operation between PHOSPHORUS projects, NRENs and other European projects. In the second year of Phosphorus project, templates of Cooperation Agreement with NRENs and Cooperation Agreement with projects were prepared. Unofficial cooperation with several NRENs and three European projects was started. It is expected that after several public demonstrations interest in project results will increase.

Section 1 contains description of formal agreements templates.

Section 2 contains information about cooperation with European NRENs and projects.

Templates of Cooperation Agreements are included in **Appendix A.**

1 Formal Agreements

The templates of formal cooperation agreements (CA) were prepared:

- for National Research and Education Networks,
- for others projects which aim the similar areas as PHOSPHORUS projects (i.e. optical networks, control planes, Grids, standardization, test-beds).

The CA with NRENs is focused on:

- Sharing the experience and technical knowledge between PHOSPHORUS and NRENs during the series of workshops foreseen within the scope of PHOSPHORUS, organised by PHOSPHORUS project for the research community,
- Exploration of possibility for NRENs to join the PHOSPHORUS test-bed and participate in the tests of new technologies and services,
- Formalization of dissemination and promotion of the PHOSPHORUS results in research community.

The purpose of the CA with projects is to:

- Achieve synergy between both projects by collaboration in the common areas of interest,
- Explore the possibility to share the experience and technical knowledge between projects during the series of workshops foreseen within the scopes of both projects and organised for partners,
- Formalize the dissemination and promotion of the projects results in research community.

Both templates have been verified and approved by General Assembly of PHOSPHORUS consortium. They are attached to this deliverable in appendix. The Cooperation Agreements are available on PHOSPHORUS web pages in public section: documents (http://www.phosphorus.pl/documents.php).

Contacts and cooperation with NRENs are established but it was not possible to sign official Cooperation Agreements because NRENs prefer less formal contacts.

2 Co-operation with EU NRENs and projects

The information about possibility of cooperation with PHOSPHORUS project was propagated to NREN Managers by appropriate mailing list of GN2 project. Many efforts were spent to advertise PHOSPHORUS activities among European NRENs and projects.

PHOSPHORUS partners actively participated (presentations, posters and demonstrations) in major conferences and workshops where possibilities of cooperation could be discussed. List of events includes ECOC 2008, TERENA'08/09, ICT'08, Phosphorus-Federica Tutorial and Workshop, On-demand network services for Scientific Community workshop and many others. More details about those events can be found in deliverableD.7.1.3[1].

2.1 Phosphorus presentations for EU NRENS:

The Phosphorus project was disseminated on network and Grid conferences where NRENs participated:

- ECOC'07: "The PHOSPHORUS project - new face of bandwidth on demand services", Artur Binczewski, (PSNC).
- GLIF'07: "Phosphorus and DRAGON methods of interdomain path setup" - Inder Monga, Nortel & Bram Peeters, (SURFnet),
- GridNets 2007: "The IST PHOSPHORUS project: A new model for integrating applications and transport network resources", Dimitra Simeonidou (UESSEX), Artur Binczewski (PSNC), George Zervas (UESSEX),
- GLIF'07: "The infrastructure of the Phosphorus project", Artur Binczewski (PSNC),
- TNC2007: "A User Provisioning Tool for EoMPLS Services Based on UCLPv1", Sergi Figuerola (i2CAT),
- OFC/NFOEC08: "A Grid-Enabled Control Plane Architecture: The PHOSPHORUS Approach", Dimitra Simeonidou (UESSEX), Eduard Escalona (UESSEX), George Zervas (UESSEX), Reza Nejabati (UESSEX), Artur Binczewski (PSNC), Gino Carrozzo (NXW), Nicola Ciulli (NXW)
- TNC2008: "Between GRIDs and Networks: GRID-enabled Network Control Planes", Bartosz Belter (PSNC),
- TNC2008: "Making GRID Applications happen" Presentation **(**UvA), Ignacio Martin Llorente **(**UvA), Ralph Koning **(**UvA), Damien Marchal **(**UvA)

- TNC2009: "Experiments with Grid-enabled Network Control Plane in the PHOSPHORUS test-bed", Bartosz Belter (PSNC),

For more details about these presentations and also many other published papers please refer to D7.1.3 report [1].

2.2 Phosphorus workshops for EU NRENS and projects

The two biggest Phosphorus events oriented to attract EU NRENS and others project was:

- Phosphorus-Federica Workshop held during TERENA'08 conference,
- On-demand network services for Scientific Community workshop during TERENA'09 conference.

2.2.1 Phosphorus-Federica Workshop

Phosphorus-Federica Workshop discussed architectural solutions for network and IT service integration over high speed network infrastructure. In particular, the workshop presented various implementations of network control and service plane architectures to support the emerging infrastructure-as-a-service model. The main goal was to share the collective experiences gained by major research projects and initiatives around the globe and explore common vision, outcomes and synergies.

Agenda of the workshop was as follows:

- Control plane capabilities and challenges - *Nicola Ciulli*, Nextworks,
- Service plane capabilities and challenges - *Piero Castoldi,* Scuola Superiore Sant'Anna,
- PHOSPHORUS GUNI solution and standardization activities - *Georgios Zervas*, University of Essex,
- Overview of FEDERICA - *Mauro Campanella*, GARR,
- Overview of CARRIOCAS - *Dominique Verchere*, Bell Labs,
- Semantic Network Description - *Freek Dijkstra*, University of Amsterdam,
- Virtualization frameworks and a service plane for multi-domain provisioning - *Sergi Figuerola*, i2CAT,
- Energy efficient network design - *Marco Melia*, Politecnico di Torino.

2.2.2 On-demand network services for Scientific Community workshop

On-demand network services for Scientific Community workshop demonstrated different approaches to the provisioning of on-demand network services for the scientific community. It tackled a number of implementations carried out by the European projects, including PHOSPHORUS (HARMONY, G^{2}MPLS, Generic AAA Authorization and Middleware Frameworks) and GÉANT2 (AutoBahn). In particular, the workshop highlights the integration between transport networks, Grid middleware, applications and supporting tools like

simulators by the presentation of solutions for seamless single-step provisioning of on-demand services across multi-domain networks.

Figure 2-1: On-demand network services for Scientific Community workshop session (Málaga, Spain, EU).

Agenda of the workshop was as follows:

- Where we are going with BoD systems - *Artur Binczewski,* PSNC,
- Lightpaths to the User using Harmony, a Phosphorus Approach for Multi-domain Resource Brokering - *Joan Antoni Garcia Espin,* i2CAT,
- Enabling Grid-Network Services via Control Plane: the Phosphorus G2MPLS way to the e-Infrastructures - *Giacomo Bernini,* NextWorks,
- Rapid Deployment of VS Workflows on PHOSPHORUS using Meta Scheduling Service - *Bjorn Hagemeier and Shahid Mohammad,* Juelich Supercomputing Centre,
- Authorisation infrastructure for on-demand multidomain Optical Network Resource Provisioning - *Yuri Demchenko,* University of Amsterdam,
- Scalable Design of Resilient Optical Grids - *Marc De Leenheer,* IBBT,
- NSI: The common interface towards network services - *Eduard Escalona,* University of Essex.

In the workshop, there were 31 participants from EU NRENS and also from NRENs outside EU (Korea, Brazil,) and Universities:

Bartosz Belter (PSNC), Freek Dijkstra (SARA), Lajos Balint (NIIF/HUNGARNET), Milosz Przywecki (PSNC), Jorgen Quist (NORDUNET), Iara Manchado (RNP), Michael Stanton (RNP), Helmut Sverenyak (CESNET), Damian Parniewicz (PSNC), A. Geurro (JRC), Ronald van der Poll (SARA), Peter Tavenier (SARA), Paul Wielinga (SARA), Sergi Figuerola (i2CAT), Victor Ray (HEAnet), Terzen van der Ham (UvA), Reza Najebati (UESSEX), Huhnuk Lim (KISTI), Jeonghoon Moon (KISTI), Sandor Rotst (USCHCNET), Ralph Neiderberger (FZJ), Stanislav Sima (CESNET), Inmdculada Bellido Estevee (Universidad de Malaga), Artur Binczewski (PSNC), Joan Antoni Garcia Espin (i2CAT), Giacomo Bernini (NextWorks), Bjorn Hagemeier (FZJ), Shahid Mohammad (FZJ) , Yuri Demchenko (UvA) , Marc De Leenheer (IBBT), Eduard Escalona (UESSEX).

After the workshop, all participants were invited to Phosphorus booth for the demonstrations of the project achievements.

2.3 Phosphorus demonstrations for EU NRENS and projects

The most exciting way of attract interest were various demonstrations of Phosphorus developments:

- Harmony system demonstrations:
  - ONDM'08, TNC'08, OGF 23, ICT'08: a high bandwidth provisioning for HD video streaming via UCLP, DRAC and ARGON domains,
  - TNC'09: anatomical data transmitted from HSVO to demo booth over provisioned light-path,
  - TNC'09: a high bandwidth provisioning for HD video streaming from KISTI domains to demo booth,
- G^2MPLS Control Plane demonstrations:
  - ICT'08 and TNC'09: multi-domain path provisioning for DDSS backup file application,
  - TNC'09: Ethernet anycast path provisioning for KodaviS application,
- Generalised Token Based Networking demonstration:
  - TNC'09: multiple applications share common network resources in token authorized environment.

Figure 2-2: Developments on-demand demonstrations at the PHOSPHORUS booth (TNC 2009)

During these presentations, there were presented Phosphorus two Bandwidth on Demand systems: Harmony and G^{2}MPLS Control Plane cooperating with Grid applications and Grid middleware not only for network resource provisioning but also for Grid resource co-allocation. Additionally there were presented AAA system for network provisioning systems. All these Phosphorus developments were targeted to interests EU and Non-EU NRENs. During TNC'09 demonstration, there were participating KISTI NREN from Korea which have installed Harmony system which was additionally interconnected with Phosphorus testbed (please see **Figure 2-3**).

All Phosphorus demonstrations are described in D6.7 [6] and D7.1.3 report [1].

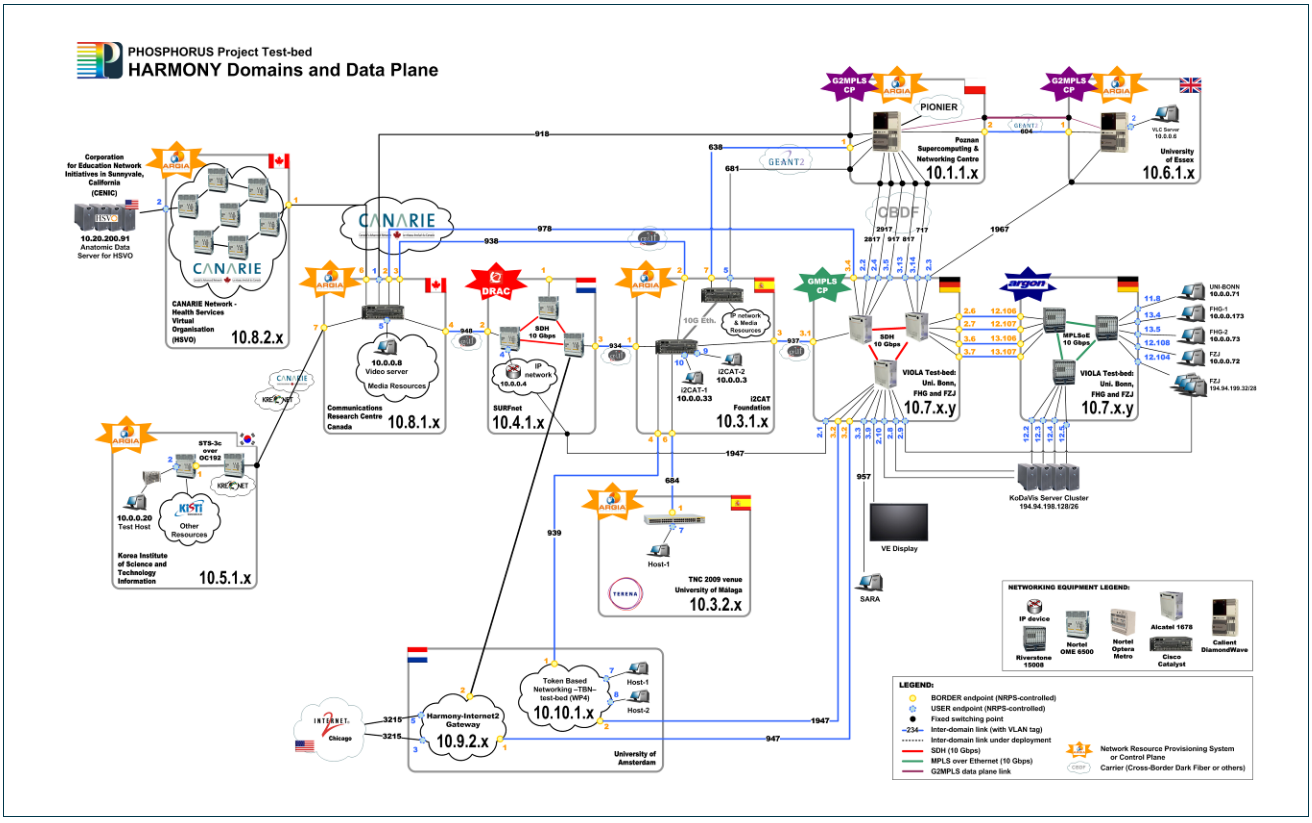

Figure 2-3: PHOSPHORUS test-bed used at TNC 2009 (Málaga, Spain, EU).

2.4 Phosphorus questionnaires for EU NRENS

In the first year, the PHOSPHORUS project was primarily focused on implementation of the software, which subsequently could be used also by the NRENs. Two questionnaires were prepared and sent to the NRENs and supercomputing centers:

- G^{2}MPLS/NRPS NREN Questionnaire - to evaluate the requirements and possible plans of the NRENs towards GMPLS adoption in their infrastructures,
- G^{2}MPLS/NRPS Questionnaire for Super-computing Centers to poll further requirements and willingness towards the one-step co-allocation of Grids and Network Resources through Network Control Plane solutions.

The NREN questionnaire was circulated to the wider NREN community during the TERENA European Future Networking Initiative Workshop, held on February 22nd 2007 in Amsterdam (http://www.terena.org/activities/efniw/programme.html). Two internal consortium partners (CESNET and PSNC) and four external partners (FCCN, DFN, GARR and HEAnet) provided the answers.

NREN	GMPLS already deployed ?	Deployment plans for GMPLS	Potential partners to run G²MPLS (HPC centers/Grid sites)	Planned NRPS deployment
CESNET	No	Yes, when available and secure	EGEE	Plans to deploy in test network and in operational network
DFN	No, only in testbed	No, only in testbed	FZ Jülich	Yes, but only in test-bed (ARGON)
FCCN	No	No, possible deployment in test-bed		No
GARR	No	4Q 2008	INFN-CNAF CINECA	Yes, not before 2H 2008
HEANET	No	No, but may be possible	Grid-Ireland e-INIS	Yes
PIONIER	No	2008	PSNC/TASK	Yes

Table 1. Summary of results from NREN survey

Template of questionnaire can be found on PHOSPHORUS website (http://www.phosphorus.pl/files/press/phosphorus-questionnaire.doc). More information and copy of filled questionnaires can be found in Appendix B and Appendix C of the D.2.6 deliverable [2].

2.5 Co-operation with GN2

PHOSPHORUS project closely cooperate with GÉANT2 activities in order to achieve a synergy effect and improve future network services. Due to PHOSPHORUS objectives the JRA3 Bandwidth on Demand (BoD) activity was selected as the liaison point and common benefits are expected to be visible before projects ends. The AutoBAHN system designed and developed by JRA3 activity is aimed to be fully automatic bandwidth provisioning system for heterogeneous multi-domain environments. Its objectives involve possible deployment of the BoD service over various network technologies, depending on NRENs requirements. AutoBAHN architecture is not equal with that of PHOSPHORUS, however it is comparable and several similarities were pointed in the key areas The representatives of both projects had declared a cooperation in such activity. Despite of differences in the design, priorities and objectives, both systems are designed as BoD services, which are able to operate within multi-domain environment.

It was agreed two tasks in terms of Phosphorus and GN2 cooperation:

- GN2 AutoBAHN and Phosphorus Harmony systems interworking in network resource provisioning,
- GN2 AutoBAHN and Phosphorus G^{2}MPLS Control Plane interworking in network resource provisioning.

More detailed information about co-operation activities with GN2 can be found in deliverable D7.3.3 [3].

2.6 Co-operation with EGEE

The Enabling Grids for E-sciencE (EGEE) project is funded by the European Commission and aims to build on recent advances in grid technology and develop a service grid infrastructure which is available to scientists 24 hours-a-day. The project aims to provide researchers in academia and industry with access to major computing resources, independent of their geographic location. The EGEE project will also focus on attracting a wide range of new users to the Grid. The project will primarily concentrate on three core areas:

- The first area is to build a consistent, robust and secure Grid network that will attract additional computing resources,
- The second area is to continuously improve and maintain the middleware in order to deliver a reliable service to users,
- The third area is to attract new users from industry as well as science and ensure they receive the high standard of training and support they need.

The EGEE Grid will be built on the EU Research Network GÉANT and exploit Grid expertise generated by many EU, national and international Grid projects to date [4].

PHOSPHORUS' WP3 recently started to explore the possibilities of a cooperation with the EGEE SA2 activity. Some years ago EGEE had an own activity on interaction of the Grid middleware and the network layer, including research on co-allocation issues. However, this activity was stopped due to other activities considered more important. Thus, as a first approach for the exploration of possible topics for a cooperation with EGEE we selected Grid middleware and network interoperation as the environment for the current discussions on potential topics. Moreover, we started exchanging the objectives and the state of the respective activities in PHOSPHORUS and EGEE.

2.7 Co-operation with RINGrid

RINGrid is project funded by the European Commission's Sixth Framework Programme under the contract number 031891. RINGrid is an acronym that stands for "Remote Instrumentation In Next-generation GRIDs". It provides an architecture which integrates instrumentations with eInfrastructure. It encompasses the current state of art and near future technology, delivers conceptual design of missing architectural 'pieces' and is supported by Grid environment. The main objectives of the RINGrid project include: the systematic identification of instruments and corresponding user communities, a definition of their requirements as well as careful analysis of the synergy between Remote Instrumentation and next-generation high speed communications networks and grid infrastructure as a basis for the definition of recommendations for designing

next-generation Remote Instrumentation Services. The dissemination of project results among scientific, industrial and business groups of users will promote egalitarian access to the European e-Infrastructure and increase awareness of benefits from using next-generation Remote Instrumentation Systems [5].

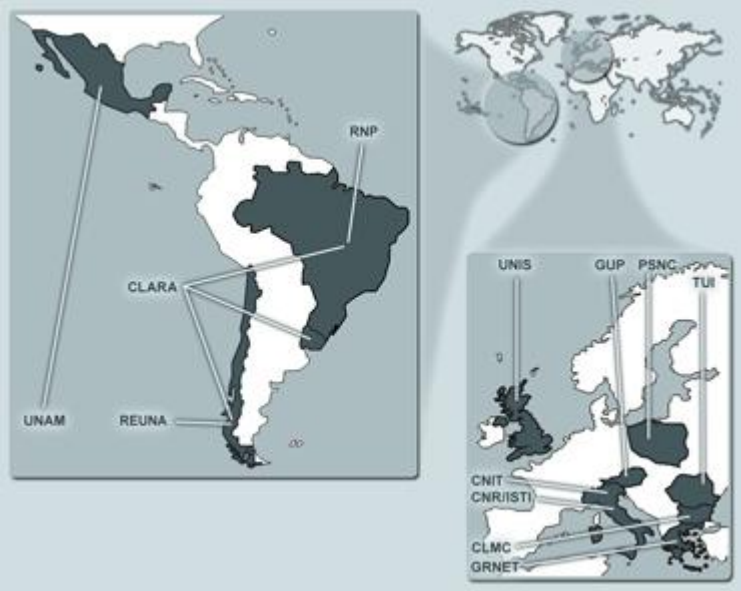

Figure 3. RINGrid participants [5]

PHOSPHORUS project and its objectives were presented during "3rd Technical Meeting on Remote Instrumentation in Next−generation Grids" organized in frames of IMEKO'07 on 20-21 September 2007 in Iasi, Romania. Participants of the meeting expressed interest in PHOSPHORUS activities, especially in usability of PHOSPHORUS' G^{2}MPLS implementation for GRIDs. More information can be found online at: http://www.ringrid.eu/index.php?option=com_content&task=view&id=125&Itemid=2

2.8 Co-operation with Carriocas

CARRIOCAS studies and implements an ultra high bit rate (up to 40Gb/s per channel) optical fiber core network to meet the scientific and industrial needs in remote usage of computing and storage resource for high performance interactive/collaborative simulations and virtual prototyping.

The main goals of the Carriocas project are:

- to develop cost-effective and reliable 40Gb/s transmission systems,
- to adapt network architecture, management, protocols, algorithms to distributed application requirements (high connectivity dynamics, stringent quality of service),

- to implement high performance applications: high resolution interactive visualization on a remote picture wall and distributed massive data storage system,

- to test and validate the approaches on an experimental network.

The project is coordinated by Alcatel-Lucent France and the consortium is composed of over 20 French academic and commercial partners.

Due to similar main objectives and related scope of the research carried out in Carriocas and PHOSPHORUS, the PHOSPHORUS consortium recently started to explore the possibilities of a cooperation with the Carriocas project.

As a measurable result of the discussions between the project leaders, Alcatel-Lucent Bell Labs France had hosted a two-day workshop in Paris, France, 15-16 July 2008, conducted by the IST project PHOSPHORUS and the System@atic project CARRIOCAS with the main focus on defining the specifications for network service interfaces over heterogeneous infrastructures such as networks and Grids.

Using the background of two ongoing collaborative projects, the Workshop aimed at designing new network architectures supporting well-specified network service interfaces. The participants constituted a balanced mix of experts from Telecom industries, universities, and national laboratories, all representing various Grid technology areas as well as scientific applications.

The workshop was composed of a series of presentations interspersed with discussion sessions. In the earlier session (Day 1 session), the participants of the two projects made presentations to communicate their views to the other participants. During the Day 2 sessions, the connections between topics are identified and discussed. Finally, the discussions were further refined and converted into the Workshop Report.

Workshop Agenda

Tuesday July 15th	
14:00h – 16:00h	Introductions and project presentations - CARRIOCAS (20') (**Dominique Verchere, Alcatel-Lucent Bell Labs France**) - Phosphorus (20') (**Dimitra Simeonidou, University of Essex**)
16:00h – 18:00h	East-West Network Service Interface - Phosphorus – HARMONY (**Sergi Figuerola, i2CAT**) - Phosphorus – G.E-NNI (**Gino Carrozzo, Nextworks**) - CARRIOCAS – Multi-domain network services over PCE (**Richard Douville, Alcatel-Lucent Bell Labs France**)
18:00h – 19:00h	North-South Network Service Interface - Phosphorus approach – G.OUNI (30') (**Eduard Escalona, University of Essex**)
Wed. July 16th	
9:30h – 11:00h	CARRIOCAS Service architecture - Scheduling, Reconfiguration,Virtualization (SRV) services (**Pascale Primet, INRIA**) Phosphorus G2MPLS Architecture (**Gino Carrozzo, Nextworks**) - G.E-NNI and G²MPLS architecture discussions
11:00h – 11:15h	Break
11:15h – 13:15h	Standard references to address network services

	- OGF (GNI-DMNR) (**Georges Zervas, Universiry of Essex**) - IETF (**Gino Carrozzo, Nextworks**) - ETSI-Grid (**Bela Berde, Alcatel-Lucent Bell Labs France**) - IPSphere (**Sergi Figuerola, i2CAT**) - ITU-T (**Dominique Verchere, Alcatel-Lucent Bell Labs France**)
13:15h – 14:00h	Lunch Break
14:00h – 16:30h	Partner Presentation for Network services definitions - A scenario of data exchanges and contracts between customers, GSP and SRV in CARRIOCAS **(Dominique Barth, PRiSM)** - NREN's roles in Research Projects with example of PIONER (**Bartosz Belter, PSNC**) - IaaS infrastructure (**Sergi Figuerola, i2CAT**) - Grid computing users / Orange clouds (**Xialong Kong, Orange Labs**) - Computing/Networks combination resources reservation (**Maurice Gagnaire, Telecom-Paristech**)
16:30h – 17:30h	Discussions: - User/Server, Grid application, Virtual organizations - Network operators → Infrastructure operators - Service Providers: Network service providers and their positions with other IT service providers e.g. Storage as a Service, Scientific Instruments, Computational services, etc. SLA template: language. Business context considerations for different types of actors.
17h30 – 18h00	Objective definitions, Discussions and Plan of next steps.

2.9 Collaboration with FEDERICA project

The FEDERICA project will create a European wide "technology agnostic" infrastructure made of Gigabit circuits, transmission equipment and computing nodes capable of virtualization to host experimental activities on new Internet architectures and protocols.

The FEDERICA network is based on the Research & Education multi-gigabit networks footprint. Circuits are terminated in Points of Presence (PoPs) of NRENs and GÉANT2, hosting FEDERICA nodes capable of virtualising hosts e.g. open source routers and end nodes. Virtual slices of FEDERICA's infrastructure may be allocated to network researchers for testing even with disruptive experiments within a large production substrate. The researchers will have full control on the allocated virtual nodes and network slice and access network monitoring information. Internal project research is focused on understanding and producing initial solutions for monitoring, management and control of parallel virtual networks.

FEDERICA Kick off meeting - The project's official kick-off meeting was held in Rome on 17-18 January 2008. During the event the Phosphorus's Coordinator Artur Binczewski was presenting main assumptions of the Lambda User Controlled Infrastructure For European Research. More information is available at http://www.fp7-federica.eu/events.php

During the 18th of May 2008 in Burges (Brugge), Belgium, the Phosphorus and Federica projects organized together a tutorial and workshop. This workshop discussed architectural solutions for network and IT service integration over high speed network infrastructure. In particular, the workshop presented various implementations of network control and service plane architectures to support the emerging infrastructure-as-a-service model. The main goal was to share the collective experiences gained by major research projects and initiatives around the globe and explore common vision, outcomes and synergies.

The two projects can obtain major benefits from this collaboration. On the one hand, PHOSPHORUS would be provided the computing facilities needed for running stress tests and performance analysis of the Harmony system over a wide scenario, with a high amount of IDB, HNA and NRPS entities interworking each other, following the several models studied in WP1. This testing scenario can be provided in a FEDERICA slice, as a set of computing resources (virtual machines, from now on VM) and a normal IP connectivity among them.

On the other hand, FEDERICA project would get a real user that is interested in using its virtualization capabilities. This way, FEDERICA project would test both its administrative procedures for giving a virtualized slice of its test-bed to users and, at the same time, test the stability and performance of its appliances, both software and hardware.

Finally, The Memorandum of Understanding and The Cooperation Agreement between the two projects has been signed by the project coordinators of each project.

3 Acronyms

ARGON	Allocation and Reservation in Grid-enabled Optic Networks
BoD	Bandwidth on Demand
CA	Cooperation Agreement
DRAGON	Dynamic Resource Allocation via GMPLS Optical Networks
EGEE	Enabling Grids for E-sciencE
GEANT2	Pan-European Gigabit Research Network
GEANT+	the point-to-point service in GEANT2
GMPLS	Generalized MPLS (MultiProtocol Label Switching)
G2MPLS	Grid-GMPLS (enhancements to GMPLS for Grid support)
NREN	National Research and Education Network
NRPS	Network Resource Provisioning System
OSCARS	On-Demand Secure Circuits and Advance Reservation System
RINGrid	Remote Instrumentation In Next-generation GRIDs

4 References

[1] C. Abosi, R. Nejabati, D. Parniewicz, D. Simeonidou, “PHOSPHORUS deliverable D.7.1.3 Annual Report on Dissemination Activities”, European IST project PHOSPHORUS, November 2007

[2] A. Tzanakaki, G. Markidis, N. Ciulli, G. Carrozzo, G. Giorgi, E. Escalona, A. Binczewski, M. Stroinski, J. Weglarz, B.Belter, D. Parniewicz, M. Strozyk, R. Krzywania, F. Hommes, D. Simeonidou, G. Zervas, R. Nejabati, W. Doonan, “PHOSPHORUS deliverable D.2.6: Deployment Models and Solutions of the Grid-GMPLS Control Plane”, European IST project PHOSPHORUS, May 2007

[3] D. Simeonidou, C. Abosi, M. Stroinski, A. Binczewski, D. Parniewicz, M. Przywecki, L. Gommas, „PHOSPHORUS deliverable D.7.3.3: Annual Report on EU and Non-EU Collaboration and Technical Liaison Activities”, European IST project PHOSPHORUS, November 2007

[4] EGEE project webpage, http://public.eu-egee.org/

[5] RINGRID project webpage, http://www.ringrid.eu/

[6] A. Binczewski, Y. Demchenko, G. Carrozzo, N. Ciuli, S. Figuerola, M. Garstka, D. Parniewicz, D. Simeonidou, W. Ziegler, “PHOSPHORUS deliverable D6.7: Plan of demonstrations of project results”

Appendix A Templates of Cooperation Agreements with NRENs and projects

Cooperation Agreement
between
The PHOSPHORUS project and National Research and Education Network

Purpose

The purpose of the present CA is to:

Explore the possibility to share the experience and technical knowledge between PHOSPHORUS and NREN during the series of workshops foreseen within the scope of PHOSPHORUS, organised by PHOSPHORUS project for the research community.

Explore the possibility for NREN to join the PHOSPHORUS test-bed and participate in the tests of new technologies and services.

Formalize the dissemination and promotion of the PHOSPHORUS results in research community.

Background

PHOSPHORUS http://www.ist-phosphorus.eu/

The PHOSPHORUS project focuses on delivering advanced network services to Grid users and applications interconnected by heterogeneous network infrastructures. The project is addressing some of the key technical challenges to enable on-demand end-to-end network services across multiple domains. The PHOSPHORUS network concept and test-bed makes applications aware of their complete Grid resources (computational and networking) environment and capabilities, and enables dynamic, adaptive and optimized use of heterogeneous network infrastructures connecting various high-end resources.

The main innovation introduced by PHOSPHORUS is a network Service and Control Planes concept where the network (lightpath) and Grid (computational, storage) resources are provisioned in a single-step: network and Grid-specific resources are controlled and set-up at the same time and with the same priority, with a set of seamlessly integrated procedures. From a user's perspective, this results in a real, node-to-node deployment of on-demand Grid services.

PHOSPHORUS will enhance and demonstrate solutions that facilitate communication among applications middleware, existing Network Resource Provisioning Systems, and the proposed Grid-GMPLS Control Plane. The main technical objectives are: 1) enhancements of the GMPLS Control Plane (G²MPLS) to provide optical network resources as first-class Grid resource, 2) implementation of interfaces between different NRPS to allow multi-domain interoperability with PHOSPHORUS' resource reservation system, 3) middleware extensions and APIs to expose network and Grid resources and make reservations of those resources.

To disseminate ideas and developments the PHOSPHORUS consortium will strongly interact with other relevant programmes, research activities and initiatives at the European and international level. Various network-oriented R&D projects are encouraged to share results and exchange ideas with PHOSPHORUS project.

NREN http://www...../

…

Timeframe

The collaboration is foreseen to be performed until the end of the PHOSPHORUS project.

Main Participants

The work will be carried out by PHOSPHORUS partners in co-operation with the NREN community

Financial Conditions

No transfer of funds between the PHOSPHORUS project and NREN is anticipated. However, partners may decide to transfer some of their existing resources into one or more of the co-operation activities mentioned above.

Signed:

……..	Artur Binczewski
(on behalf of the NREN)	(on behalf of the PHOSPHORUS Consortium)

Cooperation Agreement
between
The PHOSPHORUS project and Project

Purpose

The purpose of the present CA is to:

- Achieve synergy between both projects by collaboration in the common areas of interest
- Explore the possibility to share the experience and technical knowledge between PHOSPHORUS and Project during the series of workshops foreseen within the scope of PHOSPHORUS and Project, organised for partners of both projects.
- Formalize the dissemination and promotion of the PHOSPHORUS and Project results in research community.

Background

PHOSPHORUS http://www.ist-phosphorus.eu/

The PHOSPHORUS project focuses on delivering advanced network services to Grid users and applications interconnected by heterogeneous network infrastructures. The project is addressing some of the key technical challenges to enable on-demand end-to-end network services across multiple domains. The PHOSPHORUS network concept and test-bed makes applications aware of their complete Grid resources (computational and networking) environment and capabilities, and enables dynamic, adaptive and optimized use of heterogeneous network infrastructures connecting various high-end resources.

The main innovation introduced by PHOSPHORUS is a network Service and Control Planes concept where the network (lightpath) and Grid (computational, storage) resources are provisioned in a single-step: network and Grid-specific resources are controlled and set-up at the same time and with the same priority, with a set of seamlessly integrated procedures. From a user's perspective, this results in a real, node-to-node deployment of on-demand Grid services.

PHOSPHORUS will enhance and demonstrate solutions that facilitate communication among applications middleware, existing Network Resource Provisioning Systems, and the proposed Grid-GMPLS Control Plane. The main technical objectives are: 1) enhancements of the GMPLS Control Plane (G²MPLS) to provide optical network resources as first-class Grid resource, 2) implementation of interfaces between different NRPS to allow multi-domain interoperability with PHOSPHORUS' resource reservation system, 3) middleware extensions and APIs to expose network and Grid resources and make reservations of those resources.

To disseminate ideas and developments the PHOSPHORUS consortium will strongly interact with other relevant programmes, research activities and initiatives at the European and international level. Various

network-oriented R&D projects are encouraged to share results and exchange ideas with PHOSPHORUS project.

Project http://www...../

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Timeframe

The collaboration is foreseen to be performed until the end of the PHOSPHORUS or Project project.

Main Participants

The work will be carried out jointly by participants of both projects.

Financial Conditions

No transfer of funds between the two projects is anticipated. However, partners in either project may decide to transfer some of their existing resources into one or more of the co-operation activities mentioned above.

Signed:

……..	Artur Binczewski
(on behalf of the Project)	(on behalf of the PHOSPHORUS Consortium)