



034115

PHOSPHORUS

Lambda User Controlled Infrastructure for European Research

Integrated Project

Strategic objective:
Research Networking Testbeds



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Plan for Using and Disseminating the Knowledge

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Authors: Abosi, C., Nejabati, R., Parniewicz, D., Simeonidou, D.

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RE	Restricted to a group specified by the consortium (including the Commission Services)	
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Plan for Using and Disseminating the Knowledge

Abstract

The PHOSPHORUS project is expected to provide an improvement of the partners' know-how in the areas of design and integration of multi-service and multi-technologies optical networks with a particular focus on Grid application and related middleware. Therefore, accurate tracking and registration of the knowledge produced, as well as appropriate dissemination and identification of the exploitable results will be needed during the project execution. This deliverable will report the plans and efforts to disseminate and exploit the knowledge produced throughout the project's duration.

This is the second release of an evolving deliverable document. Subsequent releases are planned at M24 and M30.

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0 Executive Summary

Dissemination is crucial for any EU funded research work and as such, one of the objectives of the PHOSPHORUS project is to disseminate procedures, toolkits and middleware to EU NRENS and their users to enable authorized end-to-end dynamic service provisioning across Europe and worldwide heterogeneous network infrastructure.

This report highlights all the first year activities that aim to fulfil this objective. The structure of the document is as follows:

The document comprises three sections, all of which have a standard format for all FP6 projects: Exploitable knowledge and its use, Dissemination of knowledge and Publishable results.

Section 1, **Exploitable knowledge and its use**, presents the project results which are classified as “knowledge having a potential for industrial or commercial application in research activities or for developing, creating or marketing a product or process or for creating or providing a service”. An overview table is accompanied by text describing each exploitable result.

Section 2, **Dissemination of knowledge** presents the dissemination activities that occurred during the course of the year. An overview table of major dissemination activities is complemented with a list of all publications. The internal dissemination is briefly discussed. The section concludes with an overview table of major forthcoming events that PHOSPHORUS project expects to be represented in.

Section 3, **Publishable results**, is the last section standard to FP6 projects. This section presents each publishable exploitable result the project has generated. This section is left blank and will be updated in the subsequent releases of this deliverable.



1 Exploitable Knowledge and its Use

Taking into account the fact that the consortium consists of major research players in the fields of optical networking and Grid technologies, it is obvious that the exploitation of the results obtained in this research project through each partner organisation is the most desirable way to benefit from the work done. Each Party will enforce necessary measures to exploit project results at its level. In addition to the partners' level the Technical Board is looking for the possible co-operation with external bodies for results which are not handled by the Parties on their own.

This section provides a description of the exploitable results that are already being disseminated and those that are foreseen as possible exploitable results under the PHOSPHORUS project. The descriptions given below summarise the opportunity these results present as supportive tools to interested groups. Its aim is to highlight the relevance of the PHOSPHORUS results to their activities and the benefits that can be gained if they make use of them.

An overview list of foreseen exploitable knowledge is presented in the table below:

Exploitable Knowledge	Exploitable products(s) or measure(s)	Sector(s) of application	Timetable for Commercial use	Patent or other IPR protection	Owner and Other Partner(s) involved
Grid and GMPLS architectures	Consulting, training courses and seminars for network operators, manufacturers and service providers	1. ICT 2. Telecommunications	2007-2010	None planned	NXW, UESSEX, PSNC
Simulation Environment	Simulation Environment	1. Network Operators 2. Network Consultants	2008-2010	None	IBBT (owner), Extra functionality supplied by RACTI, UniBonn, AIT
Resource Management and Job Routing Algorithms	Advanced Control Plane	Network Operators	2008-2010	None	IBBT, RACTI, AIT, UniBonn



Exploitable Knowledge	Exploitable products(s) or measure(s)	Sector(s) of application	Timetable for Commercial use	Patent or other IPR protection	Owner and Other Partner(s) involved
Scheduling and Resource Management in Grid SOA Environments	MetaScheduling Service (MSS) supporting automatic resource allocation for annotated applications	Grid and SOA Applications	Open Source	None so far	FHG
Resource Management in Grid Middleware	UNICORE supporting resource co-allocation via MSS	Grid Middleware	Open Source	None so far	FZJ
Authorisation and Accounting Architecture for Optical Networks	Addition to GMPLS or NPRS based optical networks	Optical network service providers	2009-2010	Public Domain	UvA, UniBonn, Internet2, at later/second project stage, FHG, NXW SURFnet,
GMPLS Gateway Router	Addition to an IETF FORCES architecture based router	Campus networks connecting to GMPLS network	2009	Public Domain	UvA, Hitachi, RACTI

Table 1.1: Overview of Exploitable Results

1.1 Exploitable Results

1.1.1 Grid and GMPLS Architectures

1.1.1.1 Planned Exploitable Results

The result of the PHOSPHORUS project which NXW plans to exploit is the Grid-GMPLS Control Plane. This Control Plane result is instantiated in various forms: (a) architectural specification and study, (b) software design, (c) open source implementation, and (d) experimental activity.

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Each of these forms will present a substantial degree of innovation, all inherited from the Grid-GMPLS concept: first implementation of the Grid Network Services by a network control plane.

In addition to that, each of these forms will be suitable for exploitation by NXW, as explained in the following text.

1.1.1.2 Achieved Exploitable Results

Grid-enabled GMPLS (G²MPLS) Network Control Plane is an enhancement of the ASON/GMPLS Control Plane architecture that implements the concept of Grid Network Services (GNS). In the PHOSPHORUS framework, GNS is a service that allows the provisioning of network and Grid resources in a single-step, through a set of seamlessly integrated procedures.

G²MPLS is the main outcome to be delivered by Workpackage 2, in various forms: (a) architectural specification and deployment scenarios, (b) software design, (c) open source implementation, and (d) experimental validation in the PHOSPHORUS testbed.

According to the development plan, architectural definition of G²MPLS is the main result delivered by WP2 during the first 12 months, including:

- definition of its functional architecture and decomposition
- specification of the network interfaces (G.OUNI, G.I-NNI, G.E-NNI)
- analysis of some deployment scenarios for its integration in NRENs infrastructures.

Initial software developments are also part of the WP2 plan for the first year, but without any software or hardware integration (i.e., respectively, integration of the architectural modules developed, and integration of the stack with real transport network equipment). Therefore, all the software modules delivered in Year 1 are expected to provide the general framework for code development and basic functionalities for routing, signalling and communications across the SCN, without being usable for public demonstrations and exploitation.

The availability of the aforementioned results, contributed during Year 1 to the dissemination of the G²MPLS concepts in the research community (ref. events, conference and publications section 2.1.2) for their public and wider assessment. Some standardization activities have been initiated in Open Grid Forum GHPN Research Group as well, focusing mainly on the G.OUNI interface (<https://forge.gridforum.org/sf/go/doc14123?nav=1>).



1.1.1.3 Partners Involved in the Exploitation

NXW, as WP2 leader and responsible for the architectural work of Year 1, is the early and main beneficiary of the G²MPLS Network Control Plane design and development, UESSEX, PSNC.

1.1.1.4 How the Results Were Exploited

The Year 1 activities on G²MPLS allowed NXW staff to:

- keep the pace of the most recent GMPLS standardization activities (mainly CCAMP and ITU on the Transport Ethernet and Transport MPLS, respectively), and
- improve the knowledge of Grids and their middleware
- discuss the G²MPLS concept in renowned research communities, thus implicitly improving and promoting its position of research-performing SME at an international level.

As a preliminary side effect, this gained knowledge allowed NXW to feed its commercial activities in terms of:

- Consulting for equipment manufacturers¹ in terms of:
 - Architectural evaluation of GMPLS protocol suite (for SDH) and development
 - Support in GMPLS system proving (control plane stack debugging and assessment of standard compliance), through the definition of:
 - testing guidelines,
 - revision of test cases for, and
 - on-site support in tests execution.
- Training on ASON/GMPLS, with a target audience made of specialized technicians in the SDH field, seeking for introductory and/or detailed information. The levels of the courses have been:
 - Advanced tutorial on ASON/GMPLS
 - Courses on specific parts of the GMPLS protocol suite (e.g. organized according to the targeted network reference points – UNI, E-NNI or just I-NNI – or according to protocols): critical review of the applicable standards, design and implementation issues.

1.1.1.5 Socio Economic Impact

The Grid-GMPLS architecture will have a strong impact on the way research users access and use the transport networks, and will improve and optimize the network usage by advanced applications. The expected range of availability of operational services based on this paradigm is 3-5 years, and will influence the “classical” environments of remote and collaborative research, but especially the “newer” demanding services such as Grid applications, Collaborative Caves, Shared Virtual Reality spaces and TV broadcasting, news distribution.

¹ Non-disclosed information.



1.1.1.6 *Future Exploitable Results : Grid-GMPLS Network Control Plane*

The availability of the first prototype during Year 2 is expected to increase the exploitation channels for G²MPLS, basically deriving from the initial PHOSPHORUS public demonstrations. This is expected to translate into new or reinforced commercial partnerships for NXW.

Moreover, the G²MPLS OSS project could be used as an extremely challenging training platform for the related activities just started by NXW in Year 1, and/or as a baseline for the development of commercial protocol stacks for network operators or equipment manufacturers², potentially applied to other related frameworks (control plane for T-MPLS).

1.1.2 **Simulation Environment**

1.1.2.1 *Planned Exploitable Results*

The exploitable *result* is a set of software tools and a simulator which allow optimization of multi-domain, optical Grid networks in terms of routing/scheduling algorithms, network technologies, topologies and characteristics by network dimensioning/planning and performance analysis.

1.1.2.2 *Exploitable Results Achieved*

A software tool which allows for the simulation and optimisation of multi-domain, optical Grid Networks has been developed under the PHOSPHORUS project. This simulation tool allows for optimisation in terms of routing/scheduling algorithms, network topologies, technologies and characteristics by network dimensioning/planning and performance analysis.

The simulation tool allows for the user to configure simulations in two ways. One way of setting up a new simulation requires the user to adapt the main function of the simulator. This requires the user to write some Java-code to create and initialize all the nodes and links in the network as well as setting all their parameters. The second allows for a user to make use of a Graphical User Interface (GUI) which has been developed for the simulator. The GUI approach to setting up a simulation is easier and less error-prone. Each simulation can contain a network (containing all nodes, delays and link speeds) and a list of resources (applications and datasets) on the resource nodes of the network.

The figure below (Figure 1) shows the Graphical User Interface of the developed simulator.

² Contacts are in progress; non-disclosed information.

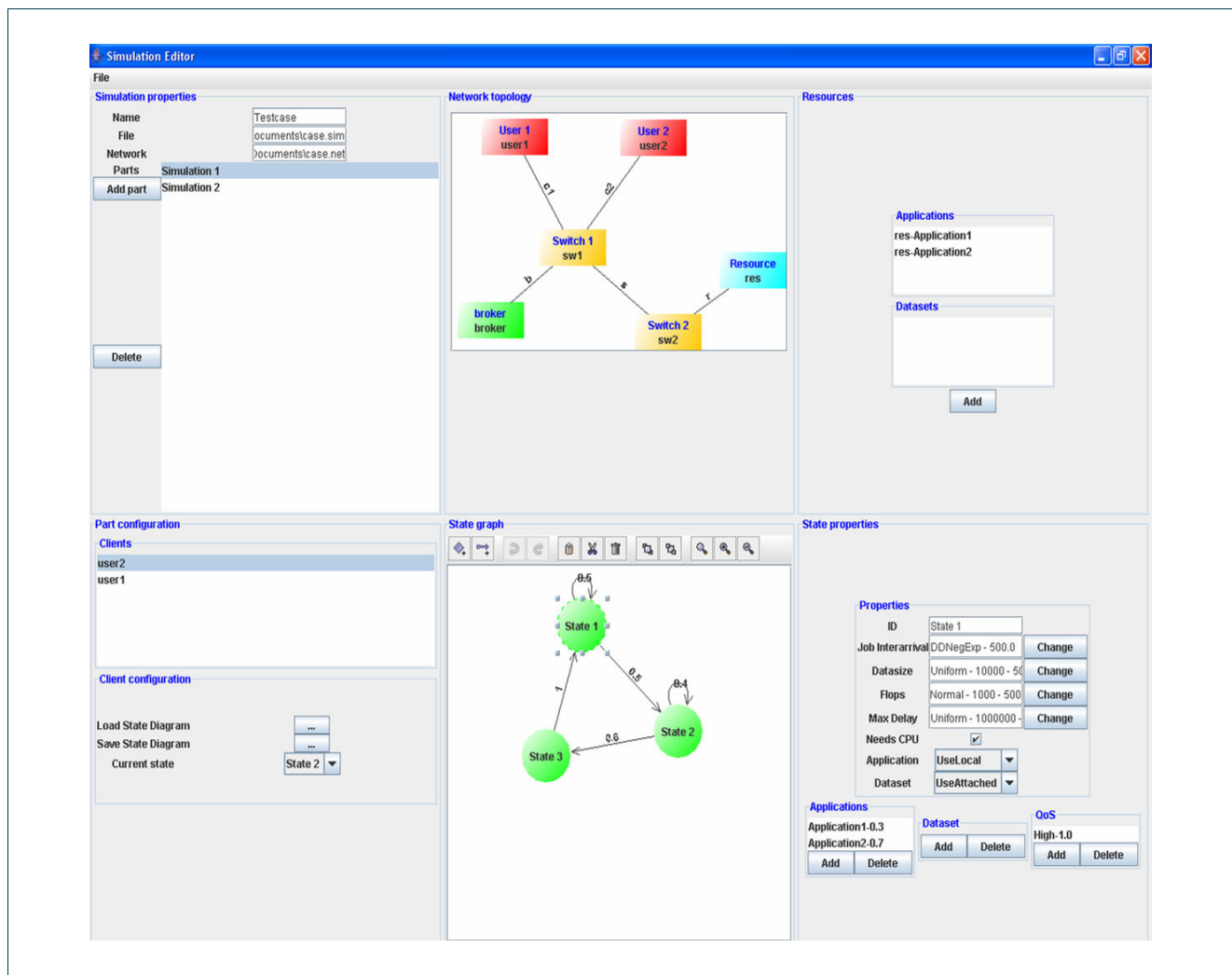


Figure 1.1: The Graphical User Interface of the Simulator

1.1.2.3 Partners Involved in the Exploitation

The main framework for the simulator was developed by IBBT – Ghent University. Other partners involved and who are responsible for extending the simulator are: RACTI (responsible QoS resource scheduling), AIT (responsible for constraint based routing) and UniBonn (responsible for advance reservations).



1.1.3 Resource Management and Job Routing Algorithms

1.1.3.1 *Planned Exploitable Results*

The exploitable result is a set of algorithms which perform advanced resource management and job routing functions. These include:

Grid job routing algorithms

Support for network, resource and service related constraints, multiple domains and multiple costs

QoS-aware resource scheduling

Anycast routing, scheduling, joint network and resource assignment

Support for advance reservations in scheduling

Malleable reservations, centralized vs. distributed control

1.1.3.2 *Exploitable Results Achieved*

A set of algorithms and models which permit and perform advance resource management and job routing functions have been developed in the past year. These include:

Job Demand Models

Models and how to obtain model parameters from real world traces have been described under the PHOSPHORUS project. These models allow for Grids to be studied without having to deploy them. This exploitable knowledge presents good probabilistic models for the job arrival process and the job characteristics which is important for the improved understanding of grid systems. It also facilitates the design and dimensioning of grid systems, the prediction of their performance, the evaluation of new scheduling strategies, and the design of a QoS framework for Grid users.

Grid Job Routing Algorithms

Grid job routing algorithms and approaches are proposed and discussed in the first year of the PHOSPHORUS project. These algorithms present an architecture to support network, resource and service related constraints, anycast-based routing in multi-domain Grid networks allowing control plane scalability, support of any subset of parameters that are available to the routing protocol and system-wide optimization of the Grid network. The algorithms have been evaluated and tested through simulation studies focusing on the PHOSPHORUS network topology.

QoS Aware Resource Scheduling

QoS Aware resource scheduling algorithms have been developed. The scheduling algorithms proposed are able to allocate the resources needed and coordinate these resources at the right time, right order and in an efficient manner in order to satisfy the QoS requirements of the users and provide fairness among the users.

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The scheduling algorithms explore anycast routing, scheduling, joint network and resource assignment and are compared by means of simulation.

Support for Advance Reservations in Scheduling

Different types of advance reservation approaches have been explored during the year. These include malleable reservations, centralised vs. distributed control as well as policies for admission control.

1.1.3.3 Partners Involved in the Exploitation

The partners involved for the development of this exploitable knowledge during the past year are IBBT – Ghent University (lead developer), RACTI (responsible QoS resource scheduling), AIT (responsible for constraint based routing) and UniBonn (responsible for advance reservations). These algorithms can be implemented and deployed in novel control/service plane solutions.

1.1.4 Scheduling and Resource Management in Grid and SOA Environments

1.1.4.1 Planned Exploitable Results

The MetaScheduling Service (MSS) will offer possibility to automatically do resource allocation and scheduling for applications or services that are annotated with their resource requirements.

The MSS is currently an open source development, thus no commercial exploitation is planned.

Research is increasingly done through specialised, domain specific interoperating services instead of stand-alone (monolithic) applications. The MSS is a leading development to be used for orchestration of services in Grid based research and in follow-up research projects.

1.1.4.2 Exploitable Results Achieved

The MetaScheduling Service (MSS) developed in the VIOLA project was explored and extended within the PHOSPHORUS project during the year.

1.1.4.3 Partners Involved in the Exploitation

The partner involved in the development of this exploitable knowledge during the past year is FHG.

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1.1.5 Resource Management in Grid Middleware

1.1.5.1 *Planned Exploitable Results*

The new Web-Service based version of the UNICORE Grid middleware will be enhanced to provide coordinated reservation and allocation of network and compute resources by integration of the MSS.

UNICORE is an open source development, thus no commercial exploitation is planned.

1.1.5.2 *Exploitable Results Achieved*

UNICORE is a major European Grid middleware that is used in various e-Science projects and production environments worldwide. During the year, design changes and extensions to the UNICORE Grid middleware were defined. These extensions provide enhancements to provide coordinated reservation and allocation of network and compute resources by integration of the MSS to the middleware. The first version of the middleware is being implemented.

Improved Integration of the MSS into UNICORE 5

An improved integration of the MSS with the UNICORE 5 middleware has been designed and implemented. This work is based on previously available prototype integration. The improved integration features a single adapter module to the UNICORE gateway allowing using the UNICORE Target System Interfaces (TSIs) to access the local scheduling systems. This has two major advantages: (i) the MSS adapters for the local scheduling systems used until now become obsolete, and (ii) the negotiation with the local scheduling now uses standard UNICORE mechanisms and the standard UNICORE gateway port. The latter allows the application of stricter firewall policies of the participating sites.

Migration to UNICORE 6

During the first year of the PHOSPHORUS project, the new Web-Service-based version 6 of the UNICORE middleware has been tested and finally released in August. The PHOSPHOSRUS project has provided the requirements and design of the MSS integration into UNICORE 6 at a very early stage of this process. This enables a natural and tight integration which will be implemented during the next months.

Adding co-allocation capabilities to the already available workflow support of UNICORE middleware enables new areas of application in Grid based research and in follow-up projects.

1.1.5.3 *Partners Involved in the Exploitation*

The partners involved for the development of this exploitable knowledge during the past year are FZJ and FHG,

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1.1.6 Authentication, Authorisation and Accounting Architecture for Optical Networks

1.1.6.1 *Planned Exploitable Results*

The result should allow individual optical network providers to recognize that a particular IP datastream has been authorized by an organization that has negotiated the usage of such link prior to requesting its usage. The architecture does not define how such authorization is granted. Various (web services based) methods can be used here. The architecture describes how such authorization can be enforced by means of recognizing a secure token that has been signed by the authorizing party. The tokens are included inside the stream of control packets (RSVP-TE messages) that are sent along the optical path via a separate control plane as defined in the IETF GMPLS architecture. The secure token will be included in an attribute field that has been defined for including Policy Data objects. The authenticity and integrity of a token is verified using a cryptographic method using a shared key. Such a key must be issued per IP flow and distributed to the generation process of a token and the verification process of the token. The token may include additional attributes, which are also signed by the key, such as a reference number which points at the agreed handling of the flow. The architecture will define how the keys, attributes and resulting tokens should be defined, created, handled and verified at places at the ingress and egress of a network. By allowing the GMPLS signalling messages, containing tokens, to cross domain boundaries, each individual domain can verify the validity of the token, and pass on the signalling if they do. Depending on the fact if each domain wants to use the same or a different key, the token needs to be regenerated at each domain's egress switch. If a domain does not natively support GMPLS (e.g. domains using a NRPS or OSS), a GMPLS agent inside such domain may be used to detect the usage of a particular path. This usage may be flagged to the NRPS, which may setup or tear down a path accordingly. Tokens may be "counted" to support an accounting process.

1.1.6.2 *Exploitable Results Achieved*

Currently AAA architecture that provides a valuable contribution to the developing generic AAA Authorisation framework (GAAA-AuthZ) in general and for Complex Resource Provisioning (CRP) as a more general usecase for the Optical Network Resource Provisioning (ONRP) has been developed and reported. This significantly extends the use of the PHOSPHORUS WP4 results and allows smooth integration of the network resources/infrastructure and Grid applications.

Particular developments include general authorisation/reservation session and policy enforcement mechanisms such as Authorisation ticket format and handling model, Token Validation Service (TVS), policy Obligations Handling Reference Model (OHRM), definition of the XACML policy profile for ONRP. All these proposed solutions have been proposed and are discussed also in the wider OGF OGSA AUTHZ-WG community and some of the issues in the practical Grid community of the EGEE and OSG consortia.

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Ongoing implementation in the framework of the AAA Toolkit will provide a platform for wide use of the proposed GAAA-AuthZ services and mechanisms by both ONRP and Grid community.

This work also provides a basis for the WP4 contribution to the standard bodies such as OGF.

1.1.6.3 Spin Off

This result may spin off into commercial use by interested commercial PHOSPHORUS partners.

1.1.6.4 Further Research

Future research and developments will focus on creating security model for the Token Based Networking (TBN), and implementation of the XACML policy profile for ONRP.

1.1.6.5 Partners Involved in the Exploitation

UvA, University of Bonn, Internet2, at later/second project stage also Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. (FHG), SURFnet and G2MPLS developers Nextworks.

1.1.7 GMPLS Gateway Router

1.1.7.1 Planned Exploitable Results

PHOSPHORUS plans to add components to a modular router, which can be used as a gateway between a regular connectionless IP (Campus) network and a connection-oriented GMPLS network of an Optical Network Service provider. This item will re-use an existing forCES based router provided by HEL, to which the project will add modules that can recognize tokens inside IP packets and use these tokens subsequently to include them into the RSVP signalling message that opens an authorized optical path in the way described in the previous subject. The token may be generated by an application, residing in the campus network and included into IP packets by using the IP options field.

1.1.7.2 Exploitable Results Achieved

Token Based Switch over IP traffic (TBS-IP) is a ForCES router designed and implemented in a prototype at UvA. Using specific encrypted tokens built-in the IP packets, TBS allows connections between a regular connectionless IP (Campus) network and a connection-oriented GMPLS network of an Optical Network Service provider. The TBS-IP router provides a web-service configuration/set-up interface to a high level authorisation and accounting service (e.g., AAA servers from UvA, OSCARS from Internet2). The TBS-IP can be programmed for a number of reserved paths/service levels using an XML Authorization ticket proposed and implemented in the PHOSPHORUS AAA/AuthZ infrastructure.

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The solution can be used to connect authorized applications, running on general campus network resources to a pre-authorized GMPLS connection, assuming that the performance of the campus network is high enough to not pose any bottleneck. The applications can negotiate with the GMPLS network to obtain the proper key material. The GMPLS network provider will provision the GMPLS gateway router to both recognize the tokens inside the IP packets from the campus side and subsequently setup and maintain the GMPLS connection a the other side.

1.1.7.3 *Future Exploitable Results*

Our TBS-IP router currently uses IXP2850 network processor. Although we use the latest network processor generation because of hardware support for encryption requirements, we plan to extend our design using other state-of-the-art technologies that offer even better performances for less energy consumption and lower costs such as FPGA customised processors.

1.1.7.4 *Partners Involved in the Exploitation*

UvA, Hitachi and University of Patras

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2 Dissemination of Knowledge

The dissemination activities listed in the table below include all first year activities. This table will be maintained and continuously updated by University of Essex which is charged with controlling the dissemination activities.

Actual Date	Type	Type of Audience	Countries Addressed	Size of Audience	Partner responsible/ involved
Information Material					
Oct 06	Project website	General	Any	Very large	PSNC
Nov 06	Project Poster	Research and Industry	Any	Large	PSNC, UESSEX
Dec 06	Project Presentation Slides	Research and Industry	Any	Large	PSNC, UESSEX
Dec 06	Project website forum	Research and Industry	Any	Potentially Large	PSNC
Sep 07	Project Brochure	Research and Industry	Any	Large	PSNC/ALL
Oct 07	Project Briefcase	Research and Industry	Any	Large	PSNC
Dec 06	Project wiki	Research and Industry	Any	<100	PSNC/ALL
Events and Conferences					
Oct 06	WOBS 06	Research	Any	Potentially Large	UESSEX
Oct 06	AGNM06	Research and Industry	Any	20-30	NXW
Nov 06	SuperComputing SC06	Research and Industry	Any	100s	UESSEX, SARA

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Actual Date	Type	Type of Audience	Countries Addressed	Size of Audience	Partner responsible/ involved
Nov 06	3 rd Conceration Meeting on e-Infrastructure	Research and Industry	EU	100s	PSNC
Dec 06	TERENA NRENs & Grids workshop	NRENs and Grid projects	EU	50	FHG
Jan 07	OptiPuter all Hands Meeting	Research and Industry	Any	<100	SARA
Jan 07	Collaboration of 3Continents Meeting	Research and Industry	Any	30	PSNC, UESSEX, UvA, NXW, FHG
Feb 07	4K Digital Cinema Streaming over Lightpaths Workshop	Research and Industry	Any	<100	SARA
Feb 07	GLIF and Internet2 Tech	Research, Industry, NRENS	Any	100s	SARA
Feb 07	TERENAs EFNIW	Research Networking Community	EU	<100	I2CAT
Mar 07	OFC/NFOEC 07	Research and Industry	Any	100s	UESSEX
Apr 07	ARES 07	Research and Industry	Any	100s	UvA
Apr 07	Internet2 Meeting	Research and Industry	Any (mostly USA)	100s	PSNC
Apr 07	Nortel Workshop	Research and Industry	Netherlands	30	SARA
May 07	IMAU Workshop (High Performance Visualisation Meeting)	Academia	Netherlands	30-40	SARA
May 07	GES 07	Research and Industry	Germany	<100	FZJ, FHG
May 07	IEEE CCGrid 07	Research and Industry	Any	100s	RACI
May 07	IFIP International Conference on Networking	Research and Industry	Any	100s	UvA

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May 07	Jülich-Karlsruhe Colloquium on Grid Computing	Grid Community, Academia	Germany	~30	FZJ
May 07	TERENA Networking Conference	Research Networking Community	EU	100s	SARA
May 07	ONDM 07	Research, Industry and Academia	Any	100s	RACI, IBBT, AIT
Jun 07	RELARN 07	Research and Academia	Russia	100s	UvA
Jun 07	IEEE POLICY 07	Research and Industry	Any	100s	UvA
Jun 07	ICNS 07	Research and Industry	Any	100s	RACI
Jun 07	GOBS	Research and Industry	Any	<100	UESSEX, IBBT
Jun 07	CineGrid Holland Festival	Research and Industry	Any	100s	SARA
Jun 07	TERENA NRENs & Grids workshop	NRENs and Grid projects	EU	50	FHG
Jun 07	International Supercomputing Conference ISC07	Research and Industry	Any	100s	PSNC, FHG
Jun 07	COINT-ACOF 07	Research and Industry	Any	100s	IBBT
Jul 07	2 nd OpenNet Workshop	Research	EU	20	NXW
Jul 07	ICTON 07	Research and Industry	Any	100s	AIT, NXW, UESSEX
Aug 07	CoreGRID Symposium	Research and Industry	EU	100s	UniBonn, FHG, FZJ, RACI
Sept 07	IEEE Broadnets 07	Research and Industry	Any	100s	IBBT
Sept 07	ECOC 2007	Research and Industry	Any	100s	UESSEX, PSNC, IBBT

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Actual Date	Type	Type of Audience	Countries Addressed	Size of Audience	Partner responsible/ involved
Sept 07	GLIF 2007	Research, Industry, NRENs	Any	120	PSNC, SARA, UvA
Sept 07	CEF Network Workshop 07	Research, Industry, NRENs	Any	50	PSNC, SARA, UvA
Sept 07	IMEKO 07	Research and Grid projects	Any	30	PSNC
Oct 07	IEEE LCN 07	Research and Industry	Any	100s	UniBonn, IBBT
Oct 07	GridNets	Research and Industry	Any	100	UESSEX, PSNC
Oct 07	Open Grid Forum	Research and Industry/ Grid Community	Any	100s	UvA, UESSEX, FHG, FZJ

Table 2.1: Dissemination Activities Overview

2.1 External Dissemination

2.1.1 Information Material

2.1.1.1 Project Website

A public website was established at the start of the project. It provides access to all public deliverables and activities as well as presentation proceedings of PHOSPHORUS organized events. These will be available for download, unless limitations due to copyright exist. The website will be active and will continually be updated during the lifetime of the project. The website is also used to publish news and related announcements.

The website also includes a private section restricted to PHOSPHORUS members permitting collaborations within the group and a link to the official PHOSPHORUS wiki. These pages are used for internal dissemination

The website can be accessed through <http://www.ist-phosphorus.eu>

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Figure 2.1: Screenshot of the PHOSPHORUS website

The figure below illustrates the number of visitors to the webpage. It presents some indicative statistics of the interest generated by the project from the website visits during the past year (1550 visits per month on average).

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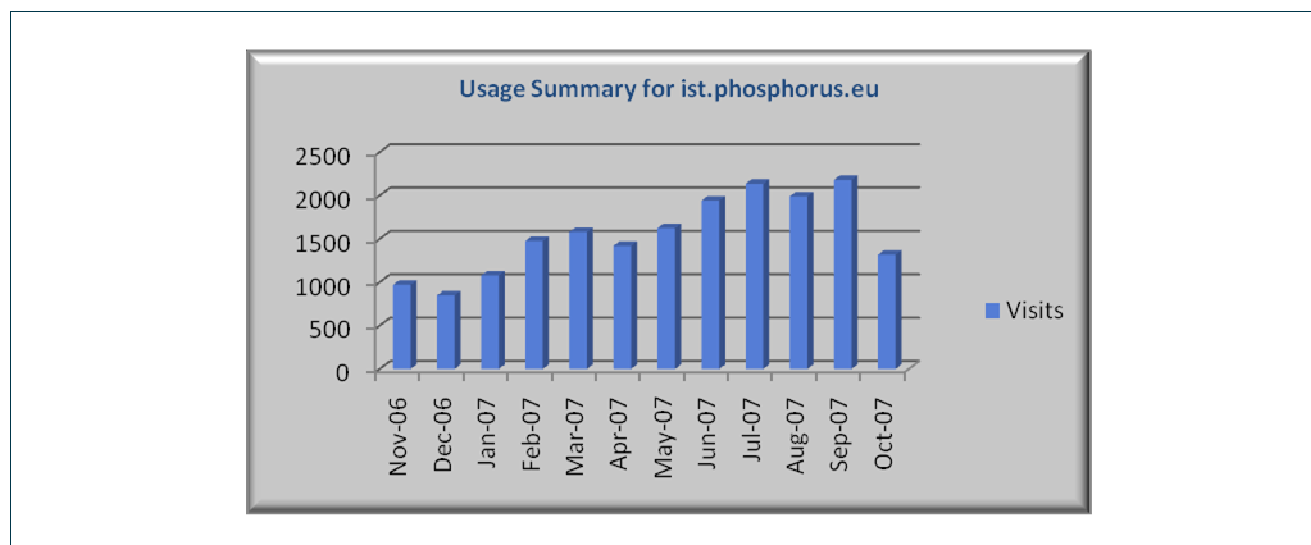


Figure 2.2: PHOSPHORUS website usage statistics for the year

2.1.1.2 Project Poster

The PHOSPHORUS poster was printed by PSNC. It describes the objectives; architecture, testbed, project partners and the projects coordinators contact details.

2.1.1.3 Project Presentation Slides

A general presentation outlining the project's structure, goal, and technical objectives has been prepared. The current status of the presentation can be accessed at http://www.ist-phosphorus.eu/files/press/Phosphorus-general_presentation.pdf

2.1.1.4 Project Brochure

A brochure that presents a detailed summary of the project objectives and the objectives and activities of each work-package was prepared by PSNC and made available at all major events where PHOSPHORUS has a presentation stand.

2.1.1.5 Project Briefcase

A summary of the PHOSPHORUS project, its objectives, technical approach and expected results are outlined in a PHOSPHORUS pamphlet / briefcase prepared by PSNC.

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2.1.1.6 Miscellaneous Information Material

Other information materials prepared by PHOSPHORUS for dissemination include white T-shirts, labels and stickers, and sweets with the PHOSPHORUS logo on it.

2.1.2 Workshop, Meetings and Conference Publications

The partners have attended numerous events where either the PHOSPHORUS project was presented or advertised by means of testbed demos, booths and PHOSPHORUS posters, briefcase, brochure, sweets and T-shirts. These events are listed in Table 2: Dissemination Activities Overview Table. Also listed in the table are conferences where the partners disseminated results (presentations, papers, posters) of the project. The publications, presentations and posters of the conferences, events and journals are listed below [1].

2.1.2.1 Workshops and Meeting Publications

1. A Binczewski, "PHOSPHORUS: Introduction and Strategy" Collaboration of Three Continents Meeting, *Presentation*, February 2007.
2. M. Garstka, "Overview of PHOSPHORUS Testbeds and Grid Resources" Collaboration of Three Continents Meeting, *Presentation*, February 2007.
3. R. van der Pol, "Lightpath monitoring in NetherLight" GLIF meeting and Internet2 Joint Tech, *Presentation*, February 2007.
4. T. Eickermann, "Network Research and Provisioning - Current and future projects of ZAM" Julick-Karlsruhe Colloquium on Grid Computing, *Presentation*, May 2007
5. Y. Demchenko, L. Gommans, C. de Laat, "Using SAML and XACML for Complex Resource Provisioning in Grid based Applications", IEEE Workshop on Policies for Distributed Systems and Networks (POLICY 2007) June 2007.
6. G. Zervas, R. Nejabati, D. Simeonidou, "Grid-empowered Optical Burst Switched Network: Architecture, Protocols and Testbed", First International Workshop on GRID over Optical Burst Switching Networks (GOBS2007), June 2007.
7. M. De Leenheer, C. Develder, F. De Turck, B. Dhoedt, P. Demeester, "Erlang Reduced Load Model for Optical Burst Switched Grids", First International Workshop on GRID over Optical Burst Switching Networks (GOBS2007) , June 2007.
8. N. Ciulli, G. Carrozzo, "PHOSPHORUS: introduction and considerations on test-beds federation", 2nd OpenNet Workshop, July 2007
9. C Barz, M Pilz, O. Wäldrich, W. Ziegler, T. Eickermann, L. Westphal, " Co-Allocating Compute and Network Resources - Bandwidth on Demand in the VIOLA Testbed", CoreGRID Symposium, August 2007.

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10. P. Kokkinos, E. Varvarigos, "Resources Configurations for providing Quality of Service in Grid Computing", CoreGRID Symposium, August 2007.
11. Artur Binczewski, "The infrastructure of the PHOSPHORUS project", GLIF Technical Working Group Meeting (GLIF'07), *Presentation*, September 2007.
12. R. van der Pol "TL1-Toolkit", GLIF Technical Working Group Meeting (GLIF'07), *Presentation*, September 2007.
13. R. van der Pol "Interdomain Monitoring Requirements", GLIF Technical Working Group Meeting (GLIF'07), *Presentation*, September 2007.
14. R. van der Pol "Experiences with the ordering and fault resolution process for multi-domain Lightpaths across hybrid networks", GLIF Technical Working Group Meeting (GLIF'07), *Presentation*, September 2007.
15. L. Gommans, "GMPLS token mechanisms" GLIF Technical Working Group Meeting (GLIF'07), *Presentation*, September 2007.
16. I. Monga, B. Peeters, "PHOSPHORUS and Dragon methods of interdomain path setup" GLIF Technical Working Group Meeting (GLIF'07), *Presentation*, September 2007.
17. R. van der Pol, "Lightpaths monitoring in SURFnet6 and NetherLight" CEF network Workshop, *Presentation* September 2007.
18. R. van der Pol, A. Toonk, "Lightpath Planning and Monitoring Tool", CEF network Workshop, *Poster* May 2007.

2.1.2.2 Conference Publications

1. D. Simeonidou, G. Zervas, R. Nejabati, "Design considerations for photonic routers supporting application-driven bandwidth reservations at sub-wavelength granularity", International Conference on Optical Burst/Package Switched Networks (WOBS06) October 2006
2. N. Ciulli, G. Carrozzo, "Making sense of Grid on IP Control Plane" IEEE/IFIP International Workshop on Autonomic Grid Networking and Management (AGNM2006), October 2006.
3. G. Zervas, R. Nejabati, Z. Wang, D. Simeonidou, S. Yu, M. O'Mahony, "A Fully Functional Application-Aware Optical Burst Switched Network Test-Bed", Optical Fibre Communication Conference and Exposition and the National Fibre Optic Engineers Conference (OFC/NFOEC07), March 2007.
4. D. Simeonidou, R. Nejabati, G. Zervas, "Optical Networks Supporting IT Services" Optical Fibre Communication Conference and Exposition and the National Fibre Optic Engineers Conference (OFC/NFOEC07), *Presentation*, March 2007.
5. Y. Demchenko, L. Gommans, C. de Laat, "Using SAML and XACML for Complex Authorisation Scenarios in Dynamic Resource Provisioning" The Second International Conference on Availability, Reliability and Security (ARES 2007) April 2007

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6. M. Riedel; W. Frings, S. Dominiczak, T. Eickermann, T. Düssel, P. Gibbon, D. Mallmann, F. Wolf W. Schiffmann, "Requirements and Design of a Collaborative Online Visualization and Steering Framework for Grid and e-Science infrastructures" German E-Science Conference (GES2007) May 2007
7. T. Eickermann, W. Frings, O. Wäldrich, O. P. Wieder, W. Ziegler, "Co-allocation of MPI Jobs with the VIOLA Grid MetaScheduling Framework", German E-Science Conference (GES2007) May 2007.
8. M. Oikonomakos, K. Christodoulopoulos, E. Varvarigos, "Profiling Computation Jobs in Grid Systems", IEEE International Symposium on Cluster Computing and the Grid (CCGrid '07), May 2007.
9. M. Cristea, L. Gommans, L. Xu, H. Bos, "The Token Based Switch: Per-Packet Access Authorisation to Optical Shortcuts" IFIP - International Conference on Networking 2007, May 2007
10. R. van der Pol, "Lightpaths monitoring in SURFnet6 and NetherLight" TERENA Networking Conference, *Presentation* May 2007.
11. R. van der Pol, A. Toonk, "Lightpath Planning and Monitoring Tool", TERENA Networking Conference, *Poster* May 2007.
12. K. Christodoulopoulos, M. Varvarigos, C. Develder, M. De Leenheer, B. Dhoedt, "Job Demand Models for Optical Grid Research", Optical Networks Design and Modelling (ONDM2007), May 2007
13. G. Markidis, S. Sygletos, A. Tzanakaki, I. Tomkos, "Job Impairment Aware based Routing and Wavelength Assignment in Transparent Long Haul Networks", Optical Networks Design and Modelling (ONDM2007), May 2007
14. Y. Demchenko, K. Wierenga, "Modern Technologies of the Federated Access to Research and Education Networks (Russian) ("Современные Технологии Федеративного Доступа к Ресурсам Научных и Университетских Сетей")", RELARN 2007, June 2007
15. K. Christodoulopoulos, V. Gkamas, E. Varvarigos, "Delay Components of Job Processing in a Grid: Statistical Analysis and Modelling", International Conference on Networking and Services (ICNS2007), June 2007
16. C. Develder, M. De Leenheer, T. Stevens, B. Dhoedt, F. De Turck, P. Demeester, "Scheduling in Optical Grids: A Dimensioning Point of View", The International Conference on the Optical Internet and the Australian Conference on Optical Fibre Technology (COINT-ACOFT2007), June 2007.
17. G. Markidis, A. Tzanakaki, N. Ciulli, G. Carrozzo, D. Simeonidou, R. Nejabati, G. Zervas, "EU Integrated Project PHOSPHORUS: Grid-GMPLS Control Plane for the Support of Grid Network Services", International Conference on Transparent Optical Networks (ICTON 2007), July 2007.
18. M. De Leenheer, C. Develder, B. Dhoedt, M. Pickavet, P. Demeester, "Design and Control of Optical Grid Networks", IEEE International Conference on Broadband Communication, Networks and Systems (BROADNETS2007) September 2007.
19. A. Binczewski, "The PHOSPHORUS project - new face of bandwidth on demand services", European Conference and Exhibition on Optical Communication'07 (ECOC'07), *Presentation* September 2007.

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20. C. Develder, M. De Leenheer, B. Dhoedt, "Evaluation of Optical Grid Scheduling Through Dimensioning", European Conference and Exhibition on Optical Communication'07 (ECOC'07), September 2007.
21. C. Barz, P. Martini, M. Pilz, F. Purnhagen, "Experiments on Network Services for the Grid", IEEE Local Computer Networks Conference (LCN2007), October 2007.
22. T. Stevens, J. Vermeir, M. De Leenheer, C. Develder, F. De Turck, B. Dhoedt, P. Demeester, "Distributed Service Provisioning Using Stateful Anycast Communications", IEEE Local Computer Networks Conference (LCN2007), October 2007.
23. D. Simeonidou, A. Binczewski, G. Zervas, "The IST PHOSPHORUS project: A new model for integrating applications and transport network resources", *Presentation* GridNets 2007, October 2007.

2.1.2.3 Journal Publications

1. K Christodouloupoulos, V Gkamas, E Varvarigos, "Statistical Analysis and Modeling of Jobs in a Grid Environment", *Journal* Accepted for publication in Springer Journal of Grid Computing.

2.2 Internal Dissemination

For the project to progress smoothly, a number of resources have been setup to aid in internal dissemination. These include a project wiki, frequent project and work-package meetings and mailing lists. In addition, various types of electronic communications aid in internal dissemination [1].

2.3 Future Dissemination Activities

2.3.1 Future Advertising Materials

PHOSPHORUS partners will continue to improve and enhance the official information material. The website and wiki is continuously kept updated with current information.

2.3.2 Future Events and Conferences

This section details events and conferences scheduled to take place in the next year in which PHOSPHORUS participation is expected.

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Nov 07	TERENA NRENs & Grids workshop, Malaga	NRENs and Grid projects	EU	50	FHG
Nov 07	APOC (Invited)	Research and Industry	Any	100	I2CAT, NXW
Nov 07	SuperComputing 07, Reno	Research and Industry	Any	100s	I2CAT, UvA, PSNC, CRC, SARA, FHG, SURFNET, FZJ
Dec 07	CHALLENGERS workshop, Oxford	Research and Industry/Grid Community	EU	<50	FHG, PSNC
Dec 07	Conference on e-Science and Grid Computing	Research and Industry	Any	>100	RACI
Jan 08	Internet2 Meeting	Research and Industry	Any (mostly USA)	100s	UvA
Feb 08	CHALLENGERS workshop, Stuttgart	Research and Industry/Grid Community	EU	<50	FHG, PSNC
Feb 08	Open Grid Forum 22, Boston	Research and Industry/ Grid Community	Any	100s	FHG, UvA UESSEX, FZJ
Feb 08	OFC/NFOEC 08 (Invited)	Research and Industry	Any	100s	UESSEX, NXW, PSNC
Mar 08	IETF	Research and Industry	Any	100s	SARA, UvA
Apr 08	CHALLENGERS workshop, Barcelona	Research and Industry/ Grid Community	Any	<50	FHG, PSNC
Apr 08	NORDUNet	Research and Industry/ Grid Community	Nordic Countries	100s	SARA
May 08	RIPE	Research and Industry	EU and neighbouring	100s	SARA
May 08	WEBIST, Madeira	Research and Industry	Any	100s	FHG

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May 08	TERENA Networking Conference	Research Networking Community	EU	100s	FHG, PSNC, FZJ, SARA
May 08	CCGrid	Research and Industry	Any	100s	FHG
Jun 08	Open Grid Forum 23, Barcelona	Research and Industry/ Grid Community	Any	100s	FHG, UvA, FZJ, SARA
Jun 08	CHALLENGERS workshop, Poznan	Research and Industry/ Grid Community	EU	<50	FHG, PSNC
Jun 08	International Supercomputing Conference, Dresden	Research and Industry	Any	>1000	FHG
Jun 08	IEEE HPDC	Research and Industry	Any	100s	FHG
Aug 08	IETF	Research and Industry	Any	100s	SARA, UvA
Aug 08	CoreGRID Symposium	Research and Industry	EU	100s	FHG
Aug 08	EuroPar	Research and Industry	Any	100s	FHG
Aug 08	UNICORE summit	Research and Industry	Any	50	FHG
Sept 08	Open Grid Forum 24, Singapore	Research and Industry/ Grid Community	Any	100s	FHG, UvA, FZJ
Sept 08	Supercomputing 08	Research and Industry	Any	100s	SARA, UvA,
Oct 08	GLIF 2008	Research, Industry, NRENs	Any	120	UvA
Oct 08	Cluster 2007, Tsukuba	Research and Industry	Any	100s	FHG
Oct 08	Grid 2007, Tsukuba	Research and Industry	Any	100s	FHG
Oct 08	Cracow Grid workshop	Research and Industry	EU	100s	FHG
Oct 08	CHALLENGERS workshop, Athens	Research and Industry/ Grid Community	EU	<50	FHG
Nov 08	IETF	Research and Industry	Any	100s	SARA, UvA

Table 2.2: Future Dissemination Activities Overview

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3 Publishable Results

By the end of the project, this section will include a complete set of all publishable exploitable knowledge.

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4 Acronyms

AAA	Authentication, Authorisation, and Accounting
AGNM	Autonomic Grid Networking and Management
APOC	Asia Pacific Optical Communications
ARES	Availability, Reliability and Security
BROADNETS	Broadband Communication, Networks and Systems
CCGrid	Cluster Computing and the Grid
COINT-ACOFT	Conference on the Optical Internet and the Australian Conference on Optical Fibre Technology
ECOC	European Conference and Exhibition on Optical Communication
EFNIW	European Future Networking Initiatives Workshop
EGEE	Enabling Grids for E-science
EU	European Union
GES	German E-Science
GLIF	Global LambdaGrid
GOBS	GRID over Optical Burst Switching Networks
HPDC	High Performance Distributed Computing
ICNS	International Conference on Networking and Services
ICTON	International Conference on Transparent Optical Networks
ISC	International Supercomputing Conference
LCN	Local Computer Networks Conference
MSS	MetaScheduling Service
NREN	National Research and Education Network
NRPS	Network Resource Provisioning System
OFC/NFOEC	Optical Fibre Communication Conference and Exposition and the National Fibre Optic Engineers Conference
OGF	Open Grid Forum
OGSA	Open Grid Services Architecture
ONDM	Optical Networks Design and Modelling
OSG	Open Science GRID
OSS	Open Source Software
POLICY	Policies for Distributed Systems and Networks
RSVP	Resource ReSerVation Protocol
SCN	Signalling Communication Network
UNICORE	European Grid Middleware (UNiform Access to COmpute RESources)
WOBS	Workshop on Optical Burst/Packet Switching
WEBIST	Web Information Systems and Technologies



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XACML eXtensible Access Control Markup Language

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5 References

1. C. Abosi, D. Simeonidou, R. Nejabati, D. Parniewicz "PHOSPHORUS deliverable D7.1.3: Annual Report on Dissemination Activities", Project deliverable, European IST project PHOSPHORUS, Oct. 2007