FP6 IST

SEEFIRE

South-East Europe Fibre Infrastructure for Research and Education

White Paper: Strategic Report on SE European Fibre Infrastructure for Research and Education

Executive Summary of SEEFIRE Deliverable 4.3 addressing stakeholders of NRENs in Southeast Europe

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Abstract: This deliverable document is a brief executive summary of the SEEFIRE deliverable D4.3, the "White Paper: Strategic Report on SE European Fibre Infrastructure for Research and Education". The SEEFIRE project was addressing the digital divide and inhibitors of research and education networking in SEE countries as well as the potential impact of NREN-initiated efforts for dark-fibre acquisition. This document targets stakeholders of NRENs in southeast Europe. The reference deliverable, which is available at http://www.seefire.org/publications, was based on a preliminary version (v0) that was made available to the European Commission for comment and was distributed to participants at the SEEFIRE policy workshop held on 17 January 2006 in Bucharest, Romania.

The SEEFIRE Project

The SEEFIRE Project is was a special support action co-funded by the FP6 IST Programme of the European Commission, building on the success of previous activities and projects, including SEEREN, to support research and education networks in southeast Europe and will provide input for preparing the next-generation networks for research and education in the region. The project started on 1 March 2005 and ended on 28 February 2006.

The objectives of SEEFIRE were:

- establish a benchmark of existing and potentially available optical fibre for NRENs in the region;
- make an analysis of the technical options available for the deployment of dark fibre and the management of optical transmission by NRENs in the region;
- report on economic aspects and regulations;
- disseminate information and increase awareness about dark-fibre deployment both at technical and policy-making levels.

The recent progress in technology for optical transmission at high speed has made the deployment of owned or leased fibre networks a reality for NRENs. SEEFIRE studied the feasibility of cost-effective gigabit networks in southeast Europe, connecting researchers and universities in the region with other research users in Europe and worldwide. In doing so, the project aimed to contribute in reducing the digital divide that affects several countries in southeast Europe.

The SEEFIRE Consortium	
TERENA (co-ordinating contractor)	The Netherlands
GRNET	Greece
CESNET	Czech Republic
NIIF/HUNGARNET	Hungary
AMREJ	Serbia and Montenegro
DANTE	United Kingdom
RoEduNet	Romania
ISTF	Bulgaria
MARNet	FYROM
ASA	Albania
BIHARNET	Bosnia and Herzegovina

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This document addresses stakeholders of National Research and Education Networks (NRENs), such as universities, research institutions, education sector, libraries etc. in South East Europe. The key messages are:

- The national stakeholders of NRENs in southeast Europe have an essential role in building an Information Society in their own country, and they can speed up the process by supporting the demand for appropriate computer networks for use by research and education;
- They should be aware of the potential benefits that they will have if they actively support the deployment of an efficient and high-powered networking infrastructure (such as, be on a par with scientific colleagues elsewhere, be able to improve scientific collaboration, employ new methods of teaching etc.);
- Such a network infrastructure must be advanced and able to deliver services comparable to those in the rest of Europe in terms of quality and bandwidth, in order to enable innovative applications, to cross the digital divide and fully integrate with the ERA;
- These services cannot be supported at the level or price of connectivity that is currently offered by telecom operators or Internet Service Providers in the countries concerned. The education and research sectors need NRENs to provide low cost, high performance networking in order to support their activities.

There is a significant digital divide in the provision of computer networking services to researchers, teachers and students in Europe, with many countries in South East Europe positioned at the lower end of the gap. Some of these countries currently have direct access to the GÉANT2 pan-European network for research and education, but many of them have no adequate national or local network infrastructure that is capable to adequately support the provision of the services that researchers, teachers and students need to collaborate with colleagues in their scientific disciplines in the country and abroad.

Various international initiatives have been supporting research and education networking in the region through a number of recent network infrastructure projects, like SEEREN/SEEREN2, co-funded by the European Commission, and the SEELight initiative, led by GRNET, the Greek NREN, under the Hellenic Plan for the Economic Reconstruction of the Balkans (HiPERB). Thanks to these projects, NRENs in the countries concerned are obtaining better connections to research and education networks in other countries, are able to participate in eInfrastracture research projects (like SEE-GRID) and are moving, slowly but steadily, towards a recognised international role (including TERENA membership and involvement in the GN2 project).

But international support on its own is not sufficient to make any substantial impact on the development of research and education networking in the less advanced regions in and around Europe. The responsibility for that development lies with the national stakeholders, and it is from there that the main policy impetus and the majority of the necessary resources have to come. As an example, even the very successful SEEREN project was not sufficient to ensure that the international links it had established could effectively be used by the research and education communities of Albania and Bosnia and Herzegovina because of the lack of a nation-wide university network in these countries.

A national network backbone connecting all research and education institutions in a country is a vitally important infrastructure.

Universities, research institutions, library and the education sector in general should fulfill their role in the process of building an Information Society in their own country, by supporting the demand for appropriate computer networks for use by research and education. They should make sure that these networks are advanced and able to deliver services comparable to those in the rest of Europe in terms of quality and bandwidth, in order to enable innovative applications.

The potential benefits that they will have if they actively support the deployment of an efficient and high-powered networking infrastructure will be enormous. Scientists from the country concerned will be on a par with scientific colleagues elsewhere, they will be able to compete internationally and be able to improve scientific collaboration. Finally, a powerful and cost-effective networking infrastructure will enable new methods of teaching and learning.

The GÉANT2 network, co-funded by the European Commission and the National Research and Education Networks of Europe through the GN2 project, constitutes a fair model to provide the highest possible amount of capacity to the countries concerned. However, due to variation of the market, certain locations can be reached by dark fibre, enabling initial access capacity of at least 10 Gbit/s and fast upgrades at marginal cost, whereas other locations cannot afford more than 155 Mbit/s or even 34 Mbit/s.

Many countries in the Balkans are much worse off. Although far behind the status of EU member states, the penetration of ICT in these countries is relatively high. PCs and mobile phones are widely available and there are a number of competing Internet Service Providers. However, the market for fixed telecommunication services (and infrastructure) is still de-facto in a monopoly or quasi-monopoly situation in many of the countries concerned, and this makes access to infrastructure for non-commercial purposes practically unaffordable.

The major obstacle to improving research and education network provision at international, national or university level is the extremely high pricing of telecommunication links, which is the result of a lack of competition and frequently persisting dominance of (ex-) monopoly telecommunications operators.

The current development among NRENs in the world is that they are heading towards optical networks. These are enabled by dark fibre, i.e., optical fibre dedicated to use by a single organisation – in this case a research network organisation – where the organisation is responsible for managing the transmission equipment to 'light' the fibre. NRENs are keen to access dark fibre to improve their networks, rather than lease data transmission services from telecom operators or commercial Internet Service Providers (ISPs).

Using optical networks on a national and global scale is strategically important for the development of advanced science and research fields. These networks enable applications and projects that could not be realised using traditional telecommunication services.

In Europe an increasing number of NRENs, like SURFnet (Netherlands), SWITCH (Switzerland), DFN (Germany), CESNET (Czech Republic) and many more, have networks based on dark fibre. At the pan-European level, the new GÉANT2 backbone will have large parts of the international links based on dark fibre.

There are various possible types of dark-fibre acquisition by NRENs, including leasing fibre with or without maintenance, buying Indefeasible Right of Use (IRU) or laying one's own fibre.

The management of optical transmission by NRENs is made possible by widely available and cost-effective technology. This has proved to be the case particularly in countries with a monopolistic market environment, where leasing the fibre and lighting it has been a winning alternative compared to leasing expensive circuits from an incumbent operator.

Southeast European countries either do not have well-established NRENs and appropriate network infrastructure, like in Bosnia and Herzegovina and in Albania, or have NRENs whose networks are at the moment predominantly based on services from telecommunication operators (Romania, Bulgaria, Greece) or that are in the process of establishing dark-fibre infrastructure (Serbia and Montenegro, FYR of Macedonia, and Greece).

Optical fibre is accessible to NRENs in SEE. There are many fibre plants in the ground. Almost in all countries there is fibre which is owned by some utility company, railways, etc. in addition to the optical infrastructure of telecommunication operators. Because the telecom operators are not keen to sell or lease fibre, NRENs should intensify their discussions with those alternative suppliers and actively pursue the acquisition of fibre for their national network footprint. From the SEEFIRE dark-fibre footprint database it can be deduced that immediate access to dark fibre is available for the NRENs of Greece, Bulgaria, Romania, Serbia and Montenegro (parts of the country), and Bosnia and Herzegovina (parts of the country). There is actually competition along a number of routes in Greece, Bulgaria and Romania. By contrast, the NRENs of the FYR of Macedonia and Albania might face some difficulties in the immediate future and further actions to access dark fibres there have to be implemented.

Certainly, significant funding is needed to support and sustain such developments. But the investment required for leasing dark fibre and deploying the required lighting equipment can bring a huge benefit in terms of network capacity and upgrade at marginal cost as compared to the cost of leasing network capacity from telecommunication operators.

As a consequence, ongoing support should be provided to NRENs in their effort to acquire a dark-fibre infrastructure for research and education at the local, national, regional and international level.

