

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 managers of NRENs in Southeast Europe

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Status –Version: Final Draft –A

Date: 09-06-2006

Distribution - Type: PU – R

Code: SEEFIRE-4.3.2

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 managers 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 managers of NRENs in South East Europe in order to improve their standing and self-confidence at national and international level. The key messages are:

- NRENs should be aware of their role in building an Information Society in their own country, and strive to provide appropriate computer networks for use by research and education;
- Managers of NRENs must ensure that they get appropriate support from higher authorities to perform their function well;
- Research and education networks 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;
- These applications and services cannot be supported at the level or price of connectivity that is currently offered by telecom operators or Internet Service Providers;
- Incumbent telecom operators in the region are not keen to sell or lease fibre to NRENs. However, there are serious opportunities for research and education institutions and NRENs in the region to acquire optical fibre, because there are sufficient fibre plants in the ground, which are owned by, for instance, railways, oil/gas companies, power companies, and Internet Service Providers;
- As a consequence, SEE countries now have a unique opportunity to follow the example of many countries in Europe and abroad that have been able to make giant leaps in the provision of high-speed networks, thereby enabling delivery of advanced services to users in a cost-effective way thanks to the acquisition of their own optical fibre networks;
- There are no major obstacles from a regulatory point of view to the acquisition of (dark) optical fibre by NRENs, although legal procedures sometimes may make the acquisition very difficult or cumbersome.

The status of research and education networking varies a lot in southeast Europe. The region includes countries that have joined the European Union a long time ago, like Greece, or more recently, like Hungary, and others like Croatia¹ that are not EU members. All these countries have very active, considerably stable and well-funded NRENs, with excellent expertise and a long-standing participation in research and education networking in Europe. There are countries in the region, like Romania and Bulgaria, which are in the process of joining the EU, but where the respective NRENs suffer from relatively low or unstable political support, partially obsolete legislation and market conditions that are not favourable to the development of research and education networking. The NRENs of all countries mentioned so far are members of CEENet, the Central and Eastern European Networking Association, and of TERENA, the Trans-European Research and Education Networking Association – with the exception of ISTF of Bulgaria, which is not a TERENA member - and participate in the GN2 project.

Another set of countries in the region includes Serbia, Montenegro and FYR of Macedonia. Although at different levels, these countries have relatively well organised NRENs and are moving fast in the deployment of their national networks. Actually AMREJ, the NREN of Serbia, is quite advanced in the deployment of dark fibre at metro and intercity level, and, together with the Hungarian NREN, has established the first cross-border fibre connection in the region (between Subotica in Serbia and Szeged in Hungary). MARNet, the NREN of FYR of Macedonia has built a Metropolitan Area Network in the country capital Skopje connecting university buildings by optical fibre. Both AMREJ and MARNet are members of CEENet and TERENA but do not participate in GN2, although representatives of the organisations are observers in the NREN Policy Committee, the governing body of the GN2 project.

Bosnia and Herzegovina and Albania do not have effective NRENs or proper national research and education networks in place at the moment, suffer from low political support and do not participate in either TERENA or GN2. It is also worth mentioning Turkey and Moldova here: although geographically belonging to the region and deserving appropriate attention, these two countries have not participated in the SEEFIRE project and are therefore not covered by this report.

In some of the countries above there is currently a lack of attention or only limited support from the respective governments for research and education networking. However, things are slowly changing. Candidate countries like Bulgaria and Romania are closer to integrating in the European Union than any other country in the region and the respective NRENs are participants in the GN2 project. Other countries find themselves at

¹ Croatia is not directly involved in the SEEFIRE project

different stages of an ongoing dialogue process with the European Union. Therefore, EU integration and approximation to the EU *Acquis Communautaire* is a priority in the international agenda of governments in all the countries covered by the SEEFIRE studies.

However, there are still huge inhibitors in place in the region, acting at the political and economic levels. The major obstacle to improving research and education network provision at international, national or university level is the extremely high pricing of telecommunication links. This is the result of the lack of competition and frequently persisting dominance of (ex-) monopoly telecommunications operators. Although the market has been formally liberalised, the situation in southeast Europe today is still very similar to the one which existed in the countries of the European Union ten years ago, and the measures which need to be taken are the same: it is vital that the market for electronic communications in the region will be fully and effectively liberalised as quickly as possible.

If measures are not taken, the research exclusion in southeast Europe will obstruct attempts to complete the realisation of the European Research Area (ERA). NRENs in SEE should be aware of the risks of information exclusion and recognise the need to close the digital divide as the only way to follow the lead of eEurope in building an Information Society.

Various international initiatives have been supporting NRENs in the region through a number of past and current 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 eInfrastructure 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.

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.

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, Montenegro 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.

SEEFIRE has explored a number of cost cases. Ballpark figures have been calculated for all countries in SEE, showing the order of magnitude of the investment required for leasing and lighting dark fibre on a 5-year basis. The most significant parameter in estimating the cost of a dark-fibre network infrastructure is the route length, because beyond a certain distance more expensive equipment needs to be used to compensate the degradation of the optical signal. So, for instance, lighting fibre in a large country with large distances between university locations like Romania will be much more expensive than in a country like FYR of Macedonia, where a large part of the route lengths are shorter than 100km.

Obviously the resulting costs are not negligible, especially when considering that the full budget of NRENs in the region is very low. But this shows that these NRENs are definitely under-resourced² and need significant high-profile investments by the respective governments.

SEEFIRE has studied the organisational issues (staff directly involved in the operation of the dark-fibre network, their education, fibre ownership models, maintenance of the network) as well as the equipment that is needed in the operation of dark-fibre based networks. Examples from early deployments of dark fibre in European and southeast European NRENs show that the move from networks based on services from telecommunication operators to dark-fibre based networks entails some changes in the procedures of network design and maintenance, and also needs new knowledge from network designers and administrators. But the examples also show that those changes are not dramatic and can be afforded. The study demonstrates how any networking organisation, not only in SEE, which is building its network infrastructure from scratch can immediately join the latest technological wave and avoid investing in the equipment and technologies that are now a thing of the past in the developed European NRENs. Using faster telecommunication channels for an affordable amount of money is extremely important for the SEE region, as it will help to ease the digital divide and increase collaboration and knowledge transfer between researchers in SEE countries and with their counterparts world-wide.

² As a matter of fact, many NRENs in SEE are understaffed and the staff is underpaid, with the result that staff members often migrate to the commercial sector.