

Report on Regulatory Issues



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1. Executive Summary

The EARNEST foresight study has looked at the expected development of research and education networking in Europe over the next 5-10 years. The study was carried out between March 2006 and November 2007. EARNEST was funded by the European Union through the GN2 project, which also provides the funding for the current generation of the pan-European research and education backbone network, GÉANT2.

The aim of EARNEST was to provide input for initiatives that could help to keep the evolution of European research networking at the forefront of worldwide developments and enhance the competitiveness of the European Research Area. EARNEST has prepared the ground for the planning of the development of research and education networking infrastructure and services after the completion of the GN2 project, at the local, national, European and intercontinental level.

EARNEST can be seen as the successor of the very successful study that was carried out in the SERENATE project in the period from May 2002 until December 2003. The results of the SERENATE study, and in particular the recommendations in its Summary Report, have been very influential on the planning and development of research and education networking in Europe in subsequent years.

After an initial preparatory phase, the EARNEST work has focused on seven study areas: researchers' requirements, technical issues, campus issues, economic issues, geographic issues, organisation and governance issues, and requirements of users in schools, the healthcare sector and the arts, humanities and social sciences. Reports have been published on the results of each of these sub-studies, as well as the current additional report on regulatory issues. The EARNEST study is rounded off by a Summary Report that contains recommendations for the relevant stakeholders.

The current report considers the implications of regulation for National Research and Education Networking organisations (NRENS)¹ in Europe². An earlier report on the same topic was produced for the SERENATE project. That report was published before the New Regulatory Framework (NRF) of the European Union had come into force in many countries; it dealt with the expected effects of the NRF. The current report is a sequel to that earlier report. It concentrates on those aspects of regulation that are most relevant to NRENS and that have been implemented or have evolved significantly since the European Union adopted the NRF. For those aspects, the report describes what has been happening or is likely to happen in the European Union, and it suggests actions that would strengthen the positions of NRENS as regulation continues to develop.

In general, the introduction of the NRF removed potential obstacles to deploying research and education networks. As was noted in the report on regulatory issues that was produced for the SERENATE study, the main implications of the NRF for NRENS were that:

- NRENS might need to clarify whether they were to be classified as operators of public networks, which have certain rights and obligations, or as operators of private networks;
- NRENS might need to be aware if any services that they provide outside closed user groups are supported by state aid and could be regarded as competing unfairly;

¹ In this report, the acronym "NRENS" is used to denote National Research and Education Networking organisations as well as the national networks provided by them.

² Many of those implications also hold, *mutatis mutandis*, for international, regional and local research and education networks, and the organisations that provide those networks.

- NRENS may have their own infrastructures (provided that they can obtain rights of way) or use infrastructures from others;
- NRENS could benefit from the lower prices that were expected as a result of competition, at least for high-speed connections.

All the implications described in the report on regulatory issues that was produced for the SERENATE study remain valid, and some of them have been reinforced since the SERENATE study was done. The developments that are considered in the current report are:

- the effectiveness of the transposition of the NRF into national legislation;
- the need to preserve regulatory independence;
- difficulties faced by network operators in establishing rights of way;
- ways in which member states may legitimately intervene to improve broadband deployment;
- attempts to make requirements light enough to protect the development of publicly available voice-over-IP;
- legal and technical actions to be taken to suppress spam and malevolent programs;
- revisions proposed for many aspects of regulation in the review of the NRF;
- the debate on the need for the European Union to have centralised regulation of electronic communications;
- the extent of harmonised and mandatory data retention;
- forms of audiovisual regulation modernised to accommodate IP television and other on-demand services;
- regulatory problems caused by the wish to stimulate next-generation network construction;
- changes to traditional mechanisms for spectrum allocation with liberalised radio-spectrum management.

These developments do not all have immediate important effects on NRENS. However, some of them reflect changes in attitude that could have quite significant consequences for NRENS.

In some cases, NRENS may be able to take actions that relate to their own member states. However, as the single market consolidates, it will be increasingly beneficial to them if their views are shared between them and expressed jointly to the European Commission and organisations in their own countries. This could be true particularly in relation to:

- adopting some of the proposals from the review of the NRF in 2006;
- making rights of way easy to obtain;
- aggregating applications for broadband support;
- creating incentives for investment in fibre;
- co-ordinating usage of the radio spectrum.

A similar development is already happening in the European Regulators Group (ERG). That group was set up in 2002 to represent the National Regulatory Authorities (NRAs) in their work with the European Commission. It is now expanding its activities so as to provide common positions on important topics and case studies of best practice. There is currently a debate between the Commission and ERG (and others) on the extent to which regulation should become more centralised. No matter how this debate ends, central regulation is likely to be increasingly important for organisations that until now have been mainly concerned with national requirements.

Many regulations only govern public networks, and most NRENS are not public networks. However, the regulations often reflect general public opinion about what is appropriate, and the distinction between public networks and publicly funded private networks is not likely to interest critics. Therefore, NRENS could displease the Commission or organisations in their own countries if they do not observe good practice in various areas, matching the practice in regulations governing public networks. The most important of those areas, which are highlighted in this report, are:

- fulfilling telephony obligations for voice-over-IP services;
- preventing the spreading of spam;
- ensuring network availability;
- retaining communication data;
- maintaining acceptable use of audiovisual material.

There could be a role for joint working groups – perhaps organised through TERENA – to clarify good practice in areas such as these for NRENS in the European Union as a whole. They could design models for codes of practice (for NRENS) that would complement existing Acceptable Use Policies (for users of NRENS), especially in member states with no applicable codes of practice.

The debate about the role of ERG and the actions to regulate international roaming charges are indicative of a trend. In the European Union, it is certain that there will be increased centralisation of regulation in some respects. Increasingly, NRENS should develop shared views to be put to the Commission.

This report envisages that NRENS will increasingly need to work together, both pro-actively (to put common positions to the European Commission) and reactively (to interpret regulations for public networks in terms of best practice for NRENS).

2. Introduction

2.1 Objectives

The SERENATE project included a study [1] of the implications of the New Regulatory Framework for National Research and Education Networking organisations. As part of EARNEST, an update of that study was commissioned that looked specifically at the implications for NRENs of what has happened since the adoption of the NRF. The current report provides that update and considers:

- the implementation of regulation since the adoption of the NRF;
- the evolution of regulation since the adoption of the NRF.

The report is largely based on publicly available materials and has been prepared without interviewing people working in National Regulatory Authorities or NRENs. Therefore, it does not describe regulation as it has been actually experienced by NRENs but rather regulation as it is viewed by organisations associated with the European Union.

2.2 Background

Directives of the European Union explain and prescribe legal provisions that EU member states must incorporate ('transpose') into national legislation³. For electronic communications there have been two sets of Directives, known as the 1998 or 'Open Network Provision' (ONP) package and the 2002 or 'New Regulatory Framework' package. The NRF package is sometimes also known as the 'Electronic Communications Framework' package.

The NRF package built on the ONP package by moving towards open markets, simplifying rules and reducing barriers for market entry. It was adopted in 2002 and came into force in 2003. All member states were required to transpose it into national legislation by that time.

In general, the changes in moving from the ONP package to the NRF package removed potential obstacles to deploying research and education networks; for example, providers of public networks just notify NRAs of their existence, instead of applying for licences. The regulatory study in the SERENATE project concluded that essentially the main implications of the NRF for NRENs were that:

- NRENs might need to clarify whether they were to be classified as operators of public networks or as operators of private networks. Public-network operators have rights to negotiate interconnection agreements and obtain interconnection prices and they have obligations regarding interconnection and potentially other matters (such as quality of service)⁴. Private-network operators do not have these rights and obligations.
- NRENs might need to be aware if any services that they provide outside closed user groups of research and education institutions are supported by state aid. Privately owned service providers might claim that there is unfair competition.

³. In the European Union, a "Regulation" is binding on all member states without being incorporated in national legislation, a "Directive" is binding on all member states and must be incorporated in national legislation within an agreed period of time (usually two or three years), a "Decision" is binding on member states and individuals to whom it is addressed, and a "Recommendation" is not binding on any member states but may influence the interpretation of national legislation. See [2] for further categories of legal documents.

⁴. According to the NRF, a public communications network is an electronic communications network used wholly or mainly for the provision of publicly available electronic communications services. If an NREN provides, for example, Internet access for schoolchildren at home, then it may be regarded as providing publicly available services, but it is unlikely that its network is used mainly for this purpose.

- NRENs may have their own infrastructures or use infrastructures from others. However, in making a choice between these implementations NRENs must evaluate the problems involved in acquiring rights of way.
- NRENs could benefit from the lower prices that were expected as a result of competition. There was still scope for decreases in prices, at least for high-speed connections and in the newer member states.

All these implications remain valid, and some of them have been reinforced by developments in regulation since the SERENATE study was carried out. The current report follows on from that earlier study carried out by SERENATE by examining what has happened since the adoption of the NRF. It differs in approach from the earlier study because:

- it does not include country-by-country analyses like those produced in the earlier study for the countries that were candidates for accession to the European Union;
- it looks more closely at aspects of regulation outside the scope of the NRF that are becoming more important as convergence develops.

2.3 Scope

This report concentrates on the aspects of regulation that are most relevant to NRENs and that have developed significantly in recent years. It does not look at all of the NRF nor at some other activities of the European Commission related to the Information Society, such as those on digital rights management. However, because the NRF remains fundamental to much of the thinking in the European Union, Appendix 1 summarises the main provisions of the NRF, essentially as in the earlier report produced by SERENATE⁵. The appendix may be useful for understanding several of the topics discussed in the report.

Broadly speaking, the developments in regulation involve either the implementation of regulation (applying existing policies and regulations of the European Union in national contexts) or the evolution of regulation (introducing new policies and regulations). At times, the distinction between the implementation of regulation and the evolution of regulation is rather blurred: evolution typically occurs through legal drafts, statements, proposals or cases, but case law, for example, leads to implementation as well as evolution. Nevertheless, for convenience the report is structured according to this distinction.

In Chapter 3, the report examines how far regulation has been implemented, and deals in particular with:

- transposition of the New Regulatory Framework;
- preservation of regulatory independence;
- establishment of rights of way;
- intervention for broadband deployment;
- protection of voice-over-IP;
- suppression of spam.

Since the adoption of the NRF, regulation has continued to evolve in ways that might affect NRENs. In Chapter 4, the report looks at each of these briefly, by considering:

- the review of the New Regulatory Framework;

⁵. See [3] for references to the original legal documents.

- centralisation of regulation;
- harmonisation of data retention;
- modernisation of audiovisual regulation;
- stimulus to the construction of next-generation networks;
- liberalisation of radio-spectrum management.

As might be expected, the topics discussed in this report do not all have immediate important effects on NREs. However, some of them reflect changes in attitude that extend beyond the implementation and evolution of regulation. For example, regulation is becoming more harmonised and more centralised, and market mechanisms are replacing administrative actions. These changes could have quite significant effects. Observations about the effects and recommendations relating them to NREs are identified throughout the report and summarised in Chapter 5.

3. Implementation of regulation since the adoption of the New Regulatory Framework

3.1 Transposition of the New Regulatory Framework

3.1.1 Developments at a European level

All EU member states were required to transpose the NRF into national legislation during 2003, following its adoption in 2002. The actual progress is documented in successive annual Communications and Staff Working Papers on European Electronic Communications Regulation and Markets from the European Commission⁶. In reality:

- by the end of 2003, seven member states had adopted complete primary legislation;
- by the end of 2004, twenty member states had adopted complete primary legislation;
- by the end of 2005, twenty-four member states had adopted complete primary legislation;
- by the end of 2006, twenty-five member states had adopted complete primary legislation.

In many cases, the primary legislation had to be followed by secondary legislation by the National Regulatory Authority (NRA)⁷. In some member states, even now not all the secondary legislation is in place; in Belgium, for example, it has been delayed by the need for agreement between federal and community governments.

The legislation is often complex and it has competed for government time and effort with other measures⁸. It is not surprising that many member states did not meet the dates in 2003, even if the delay until 2006 (in Greece) seems rather long. In particular, the member states that joined the European Union in 2004 and 2006 were remarkably successful in implementing the NRF soon after joining.

Some legislation may have shortcomings⁹. The Commission examines national legislation with that in mind. In fact, of the 140 infringement proceedings started by the Commission since the adoption of the NRF, 90 relate to implementing the NRF incorrectly. At the end of 2006, fifty of the proceedings for incorrect implementation were still outstanding. Currently, a widespread source of infringements

⁶. See [4] for references to the current and previous issues of these 'implementation reports'. The Communications are in all EU languages; the Staff Working Papers are in English only but provide more details than this report.

⁷. Primary legislation is legislation made by the legislative branch of government. Secondary legislation is legislation made by the executive branch of government under powers granted in primary legislation (or perhaps other secondary legislation), typically to add detail to primary legislation. Thus, nationally, the parliament might make primary legislation and the NRA (and many other organisations, such as municipalities) might make secondary legislation. For the European Union itself, an approximate analogy takes the Treaties to be primary legislation and the Directives to be secondary legislation.

⁸. For instance, in the United Kingdom the primary legislation (the Communications Act of July 2003) occupied 610 pages and the secondary legislation (the General Conditions of July 2003) occupied 49 pages. There are now also several codes of practice drawn up by the NRA or by groups involving both the NRA and the industry. In this case, some of the length and complexity arose because, at the same time as implementing the NRF, five government agencies were being combined for reasons of 'convergence'.

⁹. For instance, the authors of this report noted, and obtained corrections to, a significant error in the primary legislation of a country implementing the NRF, even after the legislation had been drafted with the help of outside experts, passed by the parliament and reviewed by outside experts.

is the absence of emergency caller location information; an earlier source was the limited implementation of the provisions dealing with spam in the Privacy and Electronic Communications Directive.

Various member states are already modifying the legislation in the light of experience. In Austria and Denmark, for example, the legislation has been modified in line with the Framework Directive, to ensure that NRA decisions are not automatically suspended when appeals are made. Making appeals is a well-established technique for delaying the imposition of remedies for months or even years: in various member states (such as Belgium, Cyprus, Estonia, Finland, Greece, Hungary, Malta, Poland, Slovakia, Sweden and the Netherlands), network operators have noticed that appeals can take time and are likely to make appeals on all possible occasions.

After the NRF has been transposed, NRAs can use it. They typically emphasise competition policy first and consumer policy later. In this respect, implementing competition policy largely involves performing market reviews to determine which service providers have Significant Market Power (SMP) and imposing remedies (such as access obligations and price controls) to counter SMP. Implementing consumer policy largely involves simplifying tasks (getting tariff information, resolving disputes and changing service providers, for example), and preventing abuses (scams, missing or wrong price information, and unauthorised or misleading sales, for example). These are both needed, although simplifying tasks ('consumer empowerment') is tending to become more important to NRAs, while preventing abuses ('consumer protection') is becoming relatively less important in mature markets.

According to the NRF, a service provider should only be subject to ex-ante regulation if a thorough market review by the NRA finds it to have SMP in a relevant market; eighteen such markets, some retail and some wholesale, are listed in the Recommendation on Relevant Markets. Most NRAs have now performed the market reviews, but some have not imposed effective remedies yet. The imposition of remedies is delayed by judicial appeals, public consultations and other, less obviously appropriate, procedures. Remedies are less effective when they are not detailed enough. The Commission has also complained that different NRAs have imposed remedies in inconsistent ways (for example, call termination rates are diverging) and it has noted that service providers generate approximately one-third of their revenues in member states other than their own. For these reasons the Commission would like greater powers to affect NRA decisions, as discussed in Section 4.2.1.

3.1.2 Implications for National Research and Education Networks

The direct effects of the NRF on NRENs are rather limited. Even if NRENs are public networks instead of private networks, they are unlikely to have SMP in the markets recommended for review by the Commission. The indirect effects, such as price reductions due to competition, affect NRENs along with other potential customers. These effects will vary between member states. That they are needed will be clear to organisations that have bought bandwidth in Greece. Of course, the growth of competition depends on several factors. Some of these factors relate to the sizes of the country and of the market, but among them are also the speeds of transposing the NRF into national legislation and of imposing effective remedies to counter SMP.

Differences in the growth of competition are still apparent in the European Union. Across the European Union there remain large variations in the speed with which NRENs can expect effective regulatory action that will develop competition and reduce prices. NRENs should support, through

national and international channels, the proposals put forward by the Commission (such as streamlining market reviews) that would help to reduce the variations between member states in the speed of effective regulatory action.

3.2 Preservation of regulatory independence

3.2.1 Developments at a European level

In all member states, National Regulatory Authorities could be influenced by politicians. This influence can be kept within bounds partly through constraints on the power of governments to replace NRA staff and partly through the use of public consultations that oblige NRAs to consider all the comments made¹⁰. These constraints seem rather weak in some member states. For example, in 2006 the new government in Poland replaced the NRA and promulgated a law that allows the president of the NRA to be dismissed without reasons being given. A recent law in Germany, discussed in Section 4.5.1, can be viewed in the same way: the law would go against an earlier decision of the NRA and contradict guidance from the Commission by allowing a 'regulatory holiday' to the incumbent network operator (which is still partly owned by the state) for building fast Internet access networks.

In several member states, the government has responsibilities for regulation as well as partial or total ownership of a network operator. Therefore, the Framework Directive explicitly requires that the NRA is independent both of the industry and of the branch of government having this ownership. In Cyprus, for example, for this reason ownership of the incumbent network operator was transferred from one government ministry to another. Elsewhere, the Commission is investigating whether the NRA is separate enough from other government agencies, because, for example,

- in Lithuania, a government ministry is represented by the same person on the council of the NRA and on the board of the incumbent network operator;
- in Luxembourg, people who draft telecommunications legislation in a government ministry also act as a board member of the incumbent network operator and as the president of a dark-fibre supplier owned by the state¹¹;
- in Slovakia, a government ministry funds the NRA directly (although in many member states the costs of the NRA are covered by fees paid by service providers), keeps some regulatory powers itself (over universal service and spectrum management) and controls 34% of the shares of the incumbent network operator.

3.2.2 Implications for National Research and Education Networks

In quite a few countries, the National Research and Education Network is funded more or less directly by the Ministry of Education, perhaps with contributions from the Ministry of Communications. If the NREN is funded by, and reports to, a different government ministry than the one that funds and receives reports from the NRA, then the NREN is less likely to be regarded as compromising the independence of the NRA. In addition, NRENs will be better equipped than, for example, dark-fibre suppliers owned by the state to argue in public in favour of beneficial regulatory changes.

¹⁰ However, having too many public consultations could be detrimental: voluntary sector organisations and smaller service providers might find difficulty in staying on top of the material flooding from large NRAs and might miss important changes. For instance, NRAs produce about 20 public consultations about telecommunications each year in France and Spain and almost 40 in the United Kingdom (although some of these just endorse decisions reached through other public proceedings). The NRA in the United Kingdom also produces another 40 public consultations on spectrum and broadcasting matters.

¹¹ This dark-fibre supplier is intended to supply dark fibre to network operators on non-discriminatory terms and thereby improve international high-speed connectivity. The government considers that the private sector does not provide links of sufficient speed on non-discriminatory terms. People in the private sector disagree: they fear unnecessary duplication of infrastructure and unfair competition.

3.3 Establishment of rights of way

3.3.1 Developments at a European level

To develop networks, service providers need to obtain rights of way in public or private property. The Commission believes that difficulties in obtaining rights of way are still obstacles to providing networks in at least ten member states.

Many different laws and regulations (about civil works, environmental planning, public health and general administration) affect the procedures for granting of rights of way. The procedures for obtaining permits are complicated; they depend on whether public or private property is affected, on whether cables or masts are required and on whether the requirement is for constructing, extending or maintaining infrastructure.

The Commission is concerned about possible discrimination because, for example,

- in Cyprus, alternative network operators are unable to obtain permits to install infrastructure on, under or over public property and along highways and roads (so the Commission has started infringement proceedings);
- in Greece, alternative network operators are not allowed to install infrastructure even now;
- in Italy, several network operators have difficulties in obtaining permits for access to highways (managed by private companies under state concessions), railways (managed by a state enterprise) and non-metropolitan roads (managed by a state agency);
- in Luxembourg, some network operators may be unable to obtain permits for access to highways, railways, and land owned by municipalities (especially where the municipalities themselves have cable networks);
- in Malta, the new network operator has waited for more than a year to obtain permits.

The Commission also regards the procedures in Cyprus, Greece, Italy, Poland and Spain as cumbersome and lacking in transparency.

Some member states are now providing advice to municipalities on simplifying procedures and reducing delays and they have increased the involvement of the NRAs. This is happening in Cyprus, Greece, Hungary and Spain. In fact, most member states have set deadlines on decisions about permits; failure to meet the deadlines can result in judicial proceedings or, in some member states (such as Belgium and Lithuania), automatic issuance of permits. In the United Kingdom, the NRA approves each network operator for the issuance of permits only once; thereafter the network operators simply notify public property owners about road works.

Governments may face conflicts of interest with their regulatory responsibilities if they have partial or total ownership of network operators. Similarly, municipal networks can cause conflicts of interest: municipalities may be reluctant to issue permits to network operators if they themselves are installing infrastructure. Such conflicts appear to have arisen in Ireland (in a municipality that is a beneficiary of a project partly funded by EU Structural Funds), as well as in Luxembourg. However, in the Netherlands, the legislation has been modified to ensure that municipalities do not participate in providing electronic communications networks or services, unless the municipal participation is essential and organised separately from granting rights of way.

Concerns about environmental planning and public health pose particular problems for mobile network operators. For example,

- in Cyprus, some municipalities force masts to be removed, at least if the masts have been erected illegally; both network operators have erected masts illegally, because permits for them were not granted in 2002 and 2003 and require lengthy and contorted procedures at the best of times: during the past two years the incumbent network operator had three applications (out of 84) granted and the new network operator had none;
- in Greece, some municipalities force base stations and masts to be removed; even base stations that have been erected legally have been deactivated, for unspecified reasons of environmental planning and public health; some network operators have erected base stations and masts illegally, because permits for them have not been granted since 2005 (pending the introduction of uniform procedures);
- in Luxembourg, new network operators are not allowed to share masts;
- in Spain, some municipalities tax mobile network operators for using public property and air space.

3.3.2 Implications for National Research and Education Networks

Whether National Research and Education Networking organisations have their own infrastructures or use infrastructures from others, the interests of NRENs are served by making rights of way easy to obtain. NRENs should make common cause with the organisations (typically the alternative network operators) that are pressing for the rapid implementation of simple and fair procedures for obtaining rights of way. They might present examples of good practice in regulation - such as organisational separation in the Netherlands and prior approval in the United Kingdom (see above) - for improving their own national situations.

3.4 Intervention for broadband deployment

3.4.1 Developments at a European level

The European Commission started to consider the geographic digital divide (in particular, the gap in broadband provision between urban and rural areas) in 2003, when it published a Staff Working Paper [5] to clarify when EU Structural Funds could be used for Information and Communication Technology (ICT) projects. This was followed by a report [6] in 2005, which discussed the desirability of public intervention, described the costs of different technologies and gave examples of initiatives. Following a public consultation, in 2006 the Commission issued a Communication [7] on ways of improving the availability of broadband¹². The points in this Communication that are most relevant to NRENs are the following:

- **Public intervention.** Public intervention, often through public-private partnerships using loans or grants, may accelerate broadband deployment in less profitable areas. The imposition of open-access requirements that make infrastructure accessible to competing service providers can encourage competition.
- **State aid.** When state aid is to be granted, the Commission must be told and it will assess if the aid is compatible with EU rules. Those rules allow state aid that does not affect competition adversely. The Commission has permitted several publicly funded broadband projects in rural

¹². In this report, and in many other documents, the term "broadband" refers to Internet connections that are 'always on' and that provide speeds significantly faster than dial-up connections.

and remote areas¹³. Typically the projects offer open access to all service providers and are neutral about technologies. The infrastructure is then managed by people or organisations that are independent from the state and it may have owners that are network operators selected through open tenders.

- **EU funding.** Structural Funds can contribute to the development of less advanced areas. Especially in new member states, Structural Funds can be used to ensure that ICT infrastructure is available and affordable where the market fails to do so¹⁴.

Structural Funds are already used in some ICT infrastructure projects. For example,

- in Greece, areas except in major cities are being provided with broadband networks; both fibre and radio technologies are expected to be used;
- in Hungary, towns with fewer than 15,000 inhabitants that are underserved and unattractive to private investment are receiving support for building broadband networks;
- in Ireland, 120 towns without commercial broadband suppliers are receiving support for constructing broadband networks; the networks remain in the ownership of the state and the municipalities but are to be managed under tender by a wholesale network operator that will offer services to retail service providers;
- in Lithuania, rural areas are getting 3,000 km of fibre links to complement the existing core networks; public Internet access points in these areas are also being funded partly by Structural Funds; access networks are expected in a later phase of the work.

3.4.2 Implications for National Research and Education Networks

There is an increasing requirement from staff members of research and education institutions to be able to work from home. This is to be encouraged, in keeping with the use of ICT for sustainable growth. Some of the interactions in a physical workspace can be matched quite easily in a virtual workspace; others require very high bandwidth. In addition, education institutions often have several, relatively small, campuses that collectively have a large demand for bandwidth and that can be significant in aggregating demand (possibly together with other organisations like health authorities) to create applications that make the case for support to regional infrastructure.

For these reasons, NRENs may play a prominent role in contributing to demand for broadband in rural and remote areas, as well as in urban areas. NRENs should note the possibilities for public intervention, state aid and EU funding, and for working with others to aggregate demand.

3.5 Protection of voice-over-IP

3.5.1 Developments at a European level

In an attempt to clarify the regulation of voice-over-IP (VoIP), the Commission has conducted a public consultation [8]. This consultation partly served to explain the distinctions between an electronic communications service, a publicly available electronic communications service and a Publicly

¹³. Between 2005 and 2007, the Commission permitted public funding for projects in rural and remote areas of Austria, France, Greece, Ireland, Latvia, Spain and the United Kingdom. The Commission was less easily convinced about projects in metropolitan areas, where there could already be broadband competition: it prohibited public funding for such a project in the Netherlands that might compete with existing broadband services and distort competition through discrimination. However, the Commission permitted a project in a metropolitan area in the Czech Republic, provided that the project served only the public sector and citizens accessing non-commercial websites of the public sector.

¹⁴. The processes for administering EU Structural Funds have had the reputation of being complicated and obscure. They are now to be simplified, with reductions in the number of funds from six to three; these are the European Regional Development Fund (ERDF), the European Social Fund (ESF) and the Cohesion Fund. Infrastructure projects will be eligible for funding from the ERDF and the Cohesion Fund.

Available Telephone Service (PATS) that are drawn in the Universal Service Directive. Although the Commission published the responses to the consultation, it did not issue a statement of the conclusions. However, it subsequently made a statement [9] urging NRAs in the European Union to take a 'light-touch' approach to the regulation of VoIP. Generally, the NRAs now seem to be doing this.

In fact, initially the consultation may have created as much confusion as clarification. Some NRAs thought that service providers would be allowed to choose whether to be classified as PATS providers, if their services fulfilled all the conditions laid down in the definition of PATS in the Universal Service Directive. In other words, service providers might make services 'available to the public for originating and receiving national and international calls and access to emergency services through numbers in a national or international telephone numbering plan' without incurring the obligations placed on PATS providers and gaining the rights granted to PATS providers¹⁵. The Commission finally indicated that service providers that had services fulfilling the PATS conditions would continue to incur the PATS obligations automatically and gain the PATS rights automatically; however, this view might reflect the wording of the Universal Service Directive as well as a policy choice.

Nonetheless, for any service that resembled, but was not classified as, a PATS, the Commission preferred the NRAs not to impose traditional telephony obligations but instead to ensure that consumers could make informed choices and encourage providers to upgrade the services. The Commission therefore suggested that

- PATS providers that do not own or control infrastructure should not have to ensure the uninterrupted availability of services if there are catastrophic network failures;
- VoIP service providers that provide access to the public telephone network should tell customers about the impact of power failures, the access to emergency services and the provision of caller location information in emergency calls;
- legal obligations for in-line powering should be adapted to fit VoIP services;
- users should not need to input any location information when making emergency calls or, in the case of PATS use, when configuring terminal devices;
- PATS providers at fixed locations should provide caller location information;
- VoIP service providers should devise ways of transmitting caller identification and providing caller location information in emergency calls;
- VoIP service providers should be able to be allocated both geographic and non-geographic numbers.

NRAs have interpreted this broad preference of the Commission in different ways, with different treatments of numbering, number portability, interconnection, quality of service, and emergency caller location information. In particular, the numbering available for VoIP varies: at least ten member states let all VoIP service providers offer both geographic and non-geographic numbers (sometimes with residence restrictions on the geographic numbers), but others limit the availability of geographic numbers. In Italy, for example, there is a distinction between 'fixed' (restricted nomadic) services, using geographic numbers, and nomadic services, using non-geographic numbers; only 'fixed' service providers incur all the PATS obligations¹⁶. Similarly, number portability obligations vary: at least ten member states require only porting to PATS providers, but others require porting to all service providers.

¹⁵. The PATS obligations include offering number portability, taking 'all reasonable steps to ensure uninterrupted access at fixed locations', providing emergency caller location information 'to the extent technically feasible' and, sometimes, providing calling line identification 'subject to technical feasibility and economic viability'. The PATS rights include serving numbers received through number portability and transmitting traffic received through carrier selection from service providers having SMP.

¹⁶. Moreover, in Italy all network operators must negotiate direct IP interconnection to guarantee full interoperability of VoIP services.

These differences in interpretation create difficulties for VoIP services that could be made available uniformly throughout the European Union and not just in separate member states. To assist the development of such services, the European Regulators Group is now developing a common position that NRAs could take on the regulation of VoIP, at least in relation to numbering, number portability, and emergency caller location information.

3.5.2 Implications for National Research and Education Networks

Increasingly, users rely on NREs for VoIP services, which might be 'centrally provided' or 'self provided' (like Skype used between personal computers without connections to 'traditional' telephone networks). Some of the concerns raised about VoIP in public networks are equally relevant to private networks: the distinctions between an electronic communications service, a publicly available electronic communications service and a PATS are not likely to interest users in emergencies.

What users expect depends on their countries and on their backgrounds. However, systems that offer connections to 'traditional' telephone networks are likely to create expectations among users. These expectations may be particularly strong when the systems use telephones that look conventional, but such telephones are unlikely to use line powering (by power over Ethernet or otherwise) for VoIP services. NREs that support VoIP services with connections to 'traditional' telephone networks should aim to fulfil obligations like those placed on PATS providers in their countries, at least for emergency calls.

3.6 Suppression of spam

3.6.1 Developments at a European level

The Privacy and Electronic Communications Directive requires member states to prohibit unsolicited automated electronic communications (by email, fax, SMS, MMS or other systems) unless the recipient has already opted in to receiving them. Exceptions are allowed if the communications concern products or services like those already sold to the recipient, are made to organisations (not people) or are telephone calls by people (not machines); in these cases, member states may choose to have the recipient opt out instead of opt in. The Directive also requires member states to prohibit email messages that hide the identities of the senders or exclude return addresses for cancelling future messages.

In several member states, some parts of the Directive were transposed into national legislation slowly, but in 2005 transposition was completed (except in Greece). A particular problem arose with distinguishing communications made to organisations from communications made to people, because the legal distinctions differ between member states and can be difficult for service providers to implement¹⁷. The potential fines also differ between member states, by factors of at least five. There have been few prosecutions.

In 2004, the Commission published a Communication [10] on spam. This urged that

- member states should make enforcement effective (particularly by adopting administrative remedies, including fines, not just judicial ones);
- member states should achieve international co-operation in tracing and prosecuting spammers;

¹⁷. These distinctions are wanted by more or less reputable marketing businesses. However, they limit the value of the legislation: organisations are unable to prosecute spammers effectively, although they spend large sums (said to be 2 billion euro per year in the United Kingdom, for example) on dealing with unsolicited communications. The distinctions are nonetheless adopted in many member states, where organisations need to opt out of receiving unsolicited communications; Italy is an exception.

- companies should develop self-regulation (with suitable conditions in contracts with users and codes of practice, and with suitable mechanisms for complaint handling and dispute resolution);
- companies should introduce suitable technical measures (such as the use of filtering adapted to the opt-in basis of communications, and the elimination of open relays);
- member states, companies and consumer associations should provide practical information to consumers about their rights and obligations, and about the avoidance and monitoring of spam.

To assess whether additional or corrective action was needed, the Commission held a public consultation in 2004. The Commission did not issue a statement of the conclusions, but in 2006 it published a further Communication [11] on spam. This looked at the actions that had been taken and that could be taken. It urged that

- member states should ensure that enforcement agencies have clear responsibilities and adequate resources;
- member states should subscribe to, and act in accordance with, international co-operation procedures;
- companies should prohibit, and check for, distribution of software intended for illegal storage or retrieval of information.

In the review of the NRF in 2006, the Commission proposed strengthening the rules governing security and privacy, by requiring service providers to warn users about security breaches and by allowing third parties to take legal action against spammers. The Commission is also developing a full policy on electronic crime. The problems are large enough to occupy many years of work and to need concerted international action by governments and service providers.

In 2006, the European Network and Information Security Agency (ENISA) produced surveys ([12] and [13]) of what the industry could and should do to comply with national legislation related to the Directive and the subsequent Communications. For its part, the Article 29 Data Protection Working Party, which is an independent advisory committee representing data protection authorities in the European Union, made analyses ([14] and [15]) of the legal implications.

A fairly high proportion of spam is relayed through the European Union: current reports [16] indicate that five member states (Poland, Italy, France, Germany and Spain) are among the top 12 countries that relay spam. There is a growing recognition of the need for international co-operation in dealing with spam. The Contact Network of Spam Authorities (CNSA) in the European Union fosters best practice and cross-border co-operation in complaint handling and enforcement. Its cross-border co-operation procedure is shared with the London Action Plan (LAP), which gathers enforcement agencies and other organisations from 24 countries around the world.

In 2006, the Organisation for Economic Co-operation and Development (OECD) provided a very extensive tool kit [17] for dealing with spam. This included a recommendation on cross-border co-operation that urged enforcement agencies to share information and work together.

The attention of some of these groups is now turning to the illegal installation of programs on user terminals. Users do not realise that such programs have been installed, so they do not complain, and even the nature and size of the problem are unclear.

3.6.2 Implications for National Research and Education Networks

The Privacy and Electronic Communications Directive refers mainly to publicly available electronic communications services. However, both public and private networks might be responsible for generating or propagating spam. The ENISA and OECD reports mentioned in Section 3.6.1 list many actions that service providers can take in support of legislation to suppress spam and malevolent programs. Actions related to outgoing email deserve particular attention, as they are much less frequently taken than actions related to incoming email. NREs should confirm that they, and their email service providers, are taking all the actions that can assist with suppressing spam and malevolent programs.

4. Evolution of regulation since the adoption of the New Regulatory Framework

4.1 Review of the New Regulatory Framework

4.1.1 Developments at a European level

The Commission began its review of the NRF in 2005 with a call for stakeholders to provide input. In addition, the Commission obtained independent studies and prepared a Staff Working Paper [18] before holding a public consultation in 2006. The submissions made in response to the consultation were then published. The Commission issued formal reports and draft legislative proposals [19], modifying the suggestions in the consultation, towards the end of 2007. The final legislative proposals are likely to be transposed into national legislation by 2010.

In its consultation and proposals, the Commission covered, among other matters:

- **Applying the spectrum management strategy to electronic communications.** The strategy described in Section 4.6.1 would support traded spectrum, unlicensed spectrum and traditional administratively licensed spectrum. There would be a committee and consultation process for identifying where particular ways of holding spectrum were appropriate. Rights to use spectrum would be neutral about technologies and services and would be harmonised between member states.

So far, the strategy has been implemented in the form of various Decisions aiming to harmonise spectrum use between member states for certain frequency bands. Some member states are also following parts of the strategy vigorously, by selling spectrum without reference to the technologies or services that will use it.

- **Streamlining market reviews.** NRAs would sometimes be able to include fewer details in market reviews, so that they (and the Commission) could focus on substantial problems. The simplification would begin in 2007 by reducing the number of markets needing ex-ante regulation; the Commission suggested in its consultation reducing the number from eighteen to twelve or perhaps ten, but has now proposed a revision [20] to the Recommendation on Relevant Markets that reduces the number to seven, by eliminating ex-ante regulation of retail markets other than residential fixed telephony. The Commission now considers that there can be geographic distinctions between markets (with different rules in urban and rural areas, for example).

The Commission has also proposed amendments [21] to the Framework Directive, the Access Directive and the Authorisation Directive. Besides setting timetables for use in market reviews and dispute resolution, these introduce legal criteria, based on case law, for national courts to apply in deciding whether to delay the imposition of remedies during appeals. Service providers would no longer use appeals as delaying tactics, as appears to have happened in some member states where remedies do not come into effect until well after the NRA has decided that they are

needed. However, in the opinion of some (but not all) service providers having SMP, these legal criteria might introduce an inappropriate 'one size fits all' approach and even threaten the independence of the courts.

The Commission intends to ensure that NRAs can impose functional separation of service providers to remedy unfair discrimination against competitors: NRAs could oblige service providers to put certain wholesale services into separate divisions that would provide the same services, using the same staff, systems and processes, to all customers, including the retail divisions of those service providers (as is done in the United Kingdom and as is being considered in Italy, Poland and Sweden).

- **Consolidating the single market.** Ensuring that enforcement of the NRF is consistent between the member states is seen by the Commission as a major challenge. Therefore it wants to take powers to require NRAs to conduct market reviews, impose remedies and withdraw remedies.

In the same vein, the Commission has also suggested enhancing ERG (either to offer advice on exercising these new powers or to exercise the powers itself) or introducing a separate new agency. In effect, major regulatory decisions about national markets in individual member states might be taken by a central regulator. This suggestion is not welcomed by all the NRAs, as noted in Section 4.2.1.

The requirements imposed on cross-border services between or in several countries would be harmonised. Service providers selected, authorised and bound by conditions of use on scarce resources in one member state would be able to offer their cross-border services in all member states. Technical requirements for matters such as costing methods, number portability implementations and accessibility for users with disabilities might also be harmonised by the Commission.

- **Strengthening consumer and user interests.** The Commission has now proposed amendments [22] to the Universal Service Directive and the Privacy and Electronic Communications Directive. The Commission first suggested changing the Universal Service Directive to take account of developments in carrier selection, number portability and directories (by requiring personal directory portability, for example); it did not consider extending number portability to Internet domain names or IP addresses (even though protocols such as SIP, HTTP and SMTP provide relay functions that could be used for this purpose). However, the amendments now proposed weaken the rules about carrier selection (which would be determined nationally) and strengthen the rules about number portability (which would be determined centrally).

The Commission wishes to extend the Universal Service Directive in various ways in order to improve information about tariffs and supply conditions, harmonise quality-of-service requirements, limit number portability timetables, facilitate legal action against spammers, help disabled users to reach emergency services and provide emergency caller location information. The extensions (including those for providing emergency caller location information) would be neutral about technologies and would therefore apply to VoIP services as well as to traditional fixed and mobile services.

The Commission first seemed to be content with the treatment of PATS in the Universal Service Directive. As indicated by the Commission, this has the effect that a service that happens to fulfil all the conditions laid down in the definition of PATS is necessarily a PATS, so the service provider incurs the obligations of a PATS provider. Thus a service provider that chooses to offer a PATS is subject to the obligations discussed in Section 3.5.1. This is especially significant for VoIP service providers, as it could deter them from handling emergency calls (because otherwise they might become PATS providers and incur extra obligations). However, the Commission has now proposed that the definition of PATS should not include the handling of emergency calls, which would instead be required of services offering calls to telephone numbers (as opposed to IP addresses, for example). The Commission also intends to ensure that obligations to ensure service continuity despite network failures fall on network operators, not on service providers that do not own or control infrastructure.

The Commission also said that it would like to issue a discussion paper in 2007 to obtain views on the future scope of universal service. This would follow on from a public consultation held on this topic in 2005; the responses [23] to that consultation generally expressed the view that the scope should change in the long term but not in the short term. However, this discussion paper will not appear before 2008.

- **Improving security.** The Privacy and Electronic Communications Directive would be strengthened. In particular, providers of public networks and publicly available electronic communications services would be required to
 - implement security measures (which might be mandated by NRAs acting on Recommendations by the Commission);
 - provide information about their security measures to NRAs;
 - minimise the impact of security incidents on customers and interconnected networks;
 - include in contracts clauses about actions minimising the impact of security incidents;
 - notify authorities and users about security breaches that led to loss of personal data or interruptions in service supply.

The provisions on network integrity in the Universal Service Directive would be modernised to recognise that ICT in general is critical, not just telephony. They would also differentiate more clearly between the obligations on providers of networks and obligations on providers of services using networks. This is important for VoIP as well, as VoIP service providers might not own or control IP networks and therefore might not be able to take 'all reasonable steps to ensure uninterrupted access to emergency services'.

- **Removing outdated provisions.** Various provisions would be withdrawn, as better alternatives are becoming available. The provisions in the Universal Service Directive about leased lines would be among these: network operators having SMP would no longer be required to offer the retail leased lines specified in the Decision on the Minimum Set of Leased Lines.

The Commission first suggested that the European Telephony Numbering Space (ETNS) would be formally abolished, but it has now proposed introducing instead central administration to introduce uniformity and reduce bureaucracy. The ETNS has never been implemented, because it has never had a convincing business case.

4.1.2 Implications for National Research and Education Networks

Many regulations govern only public networks or publicly available electronic communications services, and many NREs are not public networks and do not support publicly available electronic communications services. However, the regulations often reflect general public opinion about what is appropriate, and the distinction between public networks and publicly funded private networks is not likely to interest critics. Thus NREs could displease the Commission or organisations in their own countries if they do not observe good practice, matching that in the regulations governing public networks.

Ways of improving security that the Commission is likely to require might be widely applicable, especially as they are not confined to telephony. NREs should adopt as good practice those ways of improving security that the Commission is likely to require for public networks.

4.2 Centralisation of regulation

4.2.1 Developments at a European level

In 2006, the Commission made proposals for increasing the degree to which regulatory decisions were taken centrally, instead of nationally. The problems that motivated these proposals are

- **Inconsistencies in regulation between member states.** NRAs have not always applied similar remedies to similar market failures. Moreover, remedies have sometimes been
 - inadequate (when, for example, price regulation is based on cost models that are vague, inappropriate or left to be chosen by the service providers);
 - incomplete (when, for example, mobile termination rates are regulated for calls originating on mobile networks but not for calls originating on fixed networks);
 - too slow in taking effect (when, for example, mobile termination rates are left to private negotiations between operators first, with the regulator intervening only for dispute resolution)¹⁸.
- **Difficulties in regulating cross-border services.** The present arrangements for authorising cross-border services between or in several countries uniformly are complicated, as service providers need to comply with national procedures in all the countries. In particular, conditions on the use of scarce resources (such as numbers and frequency bands) are defined nationally and have little meaning outside the country of definition¹⁹. Moreover, differences in the treatment of data protection and retention between member states could prevent technical integration of operations.

The proposals by the Commission were aired partly in public pronouncements and partly in the review of the NRF. They were challenged, particularly in responses [24] by ERG. ERG was set up in 2002 under

¹⁸. In Portugal (to cite another instance of delay), the leased-lines reference offer was published twelve months after the market review ended and the wholesale line-rental offer became available eighteen months after it was mandated.

¹⁹. Rights of way are scarce resources, along with numbers and frequency bands. Although the Commission does not mention them in this context, they could perhaps also benefit from cross-border prior-approval procedures.

²⁰. ERG therefore has an official status as an advisory committee in the EU, although it has several NRAs from outside the European Union as observers. A related organisation, the Independent Regulators Group (IRG), does not have this official status and does not contain representatives of the Commission; it helps regulators to keep in touch and does some activities for ERG. Its continued separate existence can remind the Commission that the informal and informative work of ERG can move to IRG, and away from the influence of the Commission, if the official status of ERG becomes too restrictive. Yet another organisation, the Communications Committee (COCOM), contains representatives of member states and the Commission; it is an advisory and regulatory committee, which under the 'comitology' procedure works with the Commission to develop proposals by the Commission that can be accepted automatically by the Council of Ministers.

the NRF to represent the NRAs in work with the Commission²⁰. In 2006 it began its own work to deal with the problems raised by the Commission; for example, it has produced common positions on harmonised remedies for market failures in wholesale unbundled and bit-stream access.

The Commission's proposals have evolved in various aspects. They now involve:

- **Taking stronger powers.** The Commission would be able to require NRAs to conduct market reviews, impose remedies and withdraw remedies. The Framework Directive already gives the Commission powers to require the withdrawal of market review decisions that determine which service providers have SMP, but the Commission considers that these powers are insufficient.

ERG believes that the Commission would not improve consistency by taking these powers, that NRAs are best placed to design remedies appropriate to national markets, and that the Commission has not the experience, expertise or resources to assess remedies. Nonetheless, ERG recognises that some variations in remedies are unnecessary. It has therefore started to identify areas where harmonisation is possible, to prepare common positions and case studies of best practice, to ensure that NRAs provide decisions reasoned in terms of the common positions, and to name NRAs that can offer advice in particular areas. ERG expects that in due course NRAs will commit to, and be monitored by ERG for compliance with, the common positions. The annual work programme of ERG is designed to take account of requests by the Commission.

- **Enlarging the central regulatory function.** This function might be fulfilled by enhancing ERG or having a separate new agency²¹. Enhancement might involve either requiring that the Commission consult ERG before exercising certain powers (such as requiring the withdrawal of remedies) or devolving those powers to ERG, which could then be challenged in the courts. The most recent proposal from the Commission [25] replaces ERG with a new agency, the European Electronic Communications Market Authority (EECMA), which would also incorporate the European Network and Information Security Agency (ENISA).

ERG believes that the Commission has not yet involved ERG to the extent possible in the NRF and that, if the Commission does so, the steps that ERG is taking to avoid inconsistencies will all have had the desired effect before 2010, which is when changes to the NRF would occur. To fulfil its mandate more effectively, ERG is to allow decisions to be made by 2/3 majorities (instead of by consensus) and to have a full-time secretariat.

- **Harmonising the requirements on cross-border services.** For cross-border services, authorisation in one member state would constitute authorisation in all member states: 'mutual recognition' would apply, so that when the requirements on a service had been agreed, it could be provided in all member states. For cross-border services, methods of selecting and authorising service providers and conditions on the use of scarce resources would be defined and would be applied by all member states.

ERG is wary of applying mutual recognition to any services that relate to particular national markets as well as to the European Union overall. ERG also feels that mutual recognition would not be appropriate to conditions on the use of scarce resources. However, ERG believes that a common regulatory approach will have increased importance for VoIP and other services that could be delivered from anywhere and occasionally for services (such as mobile satellite services) that

²¹. The analogy of the European Central Bank has been used: national organisations can set national policy but the European Central Bank determines such policy items as co-ordinated interest rates. Of course, some member states have independent currencies, so the analogy could be extended to suggest that some member states might not make their NRAs subject to the central regulator.

could be available everywhere without reference to national variations. Even there, ERG regards co-ordination as more useful than centralisation. ERG suggests that enhancing ERG might help with this beyond 2010, but recognises that there are problems because NRAs do not have identical functions (as, for example, only some deal with spectrum and only some deal with content).

In this debate, like in the debate on international roaming charges, the Commission is taking a fairly provocative position. In both cases its public pronouncements have been preceded or followed by action by other parties (the mobile service providers, which reduced tariffs, and ERG, which introduced various ways of increasing consistency between NRAs). In the case of international roaming charges, the Commission could expect support from the media and the European Parliament on a potentially popular, and populist, topic. However, in the case of centralised regulation this support is less likely. At best, regulation is often regarded as boring, and at worst, it is resented. The media could seize on centralised regulation as another example of EU interference with cherished national liberties. The European Parliament is thought to dislike devolution of powers from the Commission to centralised organisations like ERG. International roaming charges are inevitably outside the scope of national regulation to some extent, and regulating them does not impinge greatly on national sovereignty²². Passing the powers of NRAs to another organisation is a different matter, which would require agreement from the governments of the member states.

4.2.2 Implications for National Research and Education Networks

Inconsistencies in regulation between member states and difficulties in regulating cross-border services limit the extent to which NRENs can share experiences and promote causes jointly. However, these are rather indirect effects; more direct effects are felt by international networks, which provide cross-border services and endure the differences between countries in pricing, timing and availability.

Subjecting market reviews and remedies to more central control, as the Commission proposes, will also have rather indirect effects on NRENs. Many of the markets in which inconsistencies and difficulties arise are not those that are most important to NRENs; even if market reviews and remedies become more centralised, rules governing rights of way, for example, are likely to differ between countries and, sometimes, within countries. Nevertheless, the general trend is clear. The debate about the role of ERG and the actions to regulate international roaming charges are indicative of that trend. In the European Union, it is certain that there will be increased centralisation of regulation in some respects. Increasingly, NRENs should develop shared views that could be put to the Commission.

4.3 Harmonisation of data retention

4.3.1 Developments at a European level

In 2006, the European Commission adopted the Data Retention Directive, which was to be transposed into national legislation in 2007²³. The Directive harmonised the obligations on providers

²². In fact, international roaming charges are controlled by a Regulation, not by a Directive that would then need to be transposed into national legislation by the member states.

²³. The method of adoption of the Data Retention Directive was controversial: it was adopted under a procedure requiring a majority vote in the Council and approval from the European Parliament, instead of a procedure requiring a unanimous vote in the Council and a non-binding vote in the European Parliament. Member states that wanted a more demanding Directive would have preferred the latter procedure, which is usual for matters relating to security. The government of Ireland has filed a case against the Council and the European Parliament in the European Court of Justice on these grounds. Meanwhile, a lawyer in Ireland has filed a case against the government of Ireland in the High Court of Ireland on the grounds that the national legislation related to the Directive is unconstitutional and violates the European Convention on Human Rights.

of public networks and publicly available electronic communications services to retain information about telephony and Internet communications. The information retained determines the caller (or message sender), the time and the means of communication but not the content. It is to be made available only to competent national authorities in accordance with national law for the investigation, detection and prosecution of serious crime. It is to be retained for not less than six months and not more than two years from the date of communication.

Electronic communications services in the sense of the Framework Directive provide conveyance, not content. Thus email services are electronic communications services (and may be subject to the Data Retention Directive), but search-engine services are not. This distinction is important not only to NRENs, but also, for example, to Google, which has made claims [26] that, contrary to the opinion of the Commission, it must hold personal data about users because the Data Retention Directive so demands²⁴.

The Data Retention Directive erodes privacy and could be costly to implement (especially when service providers have established record-keeping and billing systems that do not keep such information). The Article 29 Data Protection Working Party, which is formed from data protection authorities in the European Union, has noted this. Therefore it has made proposals [28] for uniform implementations of the Directive across Europe that would protect privacy and reduce costs. In its proposals, the Working Party commented that

“The Directive lacks some adequate and specific safeguards as to the treatment of communication data and leaves room for diverging interpretation and implementation by the member states in this respect.”

The Article 29 Data Protection Working Party also suggested eight safeguards (such as defining ‘serious crime’) that member states should introduce when transposing the Directive into national legislation in order to comply with the requirements of the European Convention on Human Rights and to transpose the Directive in uniform ways.

4.3.2 Implications for National Research and Education Networks

Member states may postpone applying the Data Retention Directive to Internet access, email and Internet telephony until 2009; sixteen member states are likely to do so. Nonetheless, ultimately the Directive will be applied. In principle, whether or not the Directive will be applied to NRENs depends on whether the NRENs provide public networks (or publicly available electronic communication services).

Clearly, pressure could be applied to get NRENs to follow the Data Retention Directive. It would be useful for NRENs to have a working group, perhaps organised through TERENA and using the work of the Article 29 Data Protection Working Party, to determine their attitude to, and appropriate implementations of, data retention practices like those in the Data Retention Directive.

4.4 Modernisation of audiovisual regulation

4.4.1 Developments at a European level

Current audiovisual regulation in the European Union is embodied in the Television Without Frontiers Directive. This Directive dates from 1989 but was revised in 1997. It deals with conventional television

²⁴. See [27] for references to the many criticisms of the practices of Google in collecting and keeping personal data.

broadcasting, so it now needs modernisation to reflect

- convergence, with the expansion of IP and digital television networks;
- the development of peer-to-peer exchange and community networking;
- the increase in pay-per-view programming and delivery on demand;
- the mixing of television broadcasting with delivery on demand;
- new advertising techniques, such as linkage with Internet searches and delivery by SMS.

The Commission began the modernisation process in 2002. It circulated discussion papers and received submissions in 2003. It implemented a first stage of modernisation in 2004, by issuing a Communication to clarify how the Television Without Frontiers Directive applied to new advertising techniques. It started work on a second stage in 2005, with independent studies and further discussion papers and submissions. It drafted a new Audiovisual Media Services Directive in 2006. This draft was attacked widely for covering user-generated content, having an imprecisely defined set of services and overlapping with other Directives (such as the Electronic Commerce Directive, which deals with commercial aspects of online services involving selling, advertising, information and entertainment).

The draft [29], agreed by the Commission with the European Parliament in 2007, incorporates changes related to those criticisms put forward by the European Parliament in its first reading of the draft Audiovisual Media Services Directive. It extends beyond conventional television broadcasting but states that

“television broadcasting services, i.e., linear services, currently include in particular analogue and digital television, live streaming, webcasting and near-video-on-demand, whereas video-on-demand, for example, is one of the on-demand, i.e., non-linear services.”

The draft also comments that

“The definition of audiovisual media services covers only audiovisual media services, whether scheduled or on-demand, which are mass media, that is, which are intended for reception by, and which could have a clear impact on, a significant proportion of the general public. Audiovisual media services are made up of programmes. Examples of programmes include feature-length films, sports events, situation comedy, documentary, children’s programmes and original drama. The scope is limited to services as defined by the Treaty and therefore covers any form of economic activity, including that of public service enterprises, but does not cover activities which are primarily non-economic and which are not in competition with television broadcasting, such as private websites and services consisting of the provision or distribution of audiovisual content generated by private users for the purposes of sharing and exchange within communities of interest. The definition excludes all services not intended for the distribution of audiovisual content, i.e., where any audiovisual content is merely incidental to the service and not its principal purpose.”

This comment perhaps leaves some questions open, even though elsewhere the draft is restricted to regulating ‘linear’ television broadcasts and ‘non-linear’ on-demand programmes having forms and contents comparable with those of television broadcasts. For example, it might still keep YouTube inside the scope of the draft, unless a community of interest can comprise all Internet users. Nonetheless, it suggests that the services provided by NRENs are not normally inside the scope of the draft.

However, some caution is required. The draft has antecedents that are different from those of the NRF, and the interested parties are also different. Therefore, its concepts may not be the same as those of the NRF, even though the NRF was designed to accommodate convergence.

4.4.2 Implications for National Research and Education Networks

As the draft mentioned in the previous section is intended to represent policy in the European Union as a whole, NRENs would be well advised to make their services conform with its spirit when it is relevant. Highlights of the most relevant provisions are as follows:

- **Television advertising, sponsorship and teleshopping.** Users must be clearly informed about the existence of sponsorship agreements. Television advertising and teleshopping must be readily recognisable and distinguishable from editorial content.
- **Protection of minors and public order.** This is particularly pertinent to NRENs providing services to local libraries and schools.
- **Right of reply.** In principle this could be needed in a bitter technical debate conducted using National Research and Education Networks.

None of this goes beyond conventional good practice in, for example, the publication of technical papers or the production of school broadcasts. It may occasionally involve the introduction of content filtering or monitoring. NRENs should ensure that their Acceptable Use Policies establish standards like those in the Audiovisual Media Services Directive.

4.5 Stimulus to next-generation network construction

4.5.1 Developments at a European level

Many network operators plan to change their networks to Next-Generation Networks (NGNs), typically by concentrating first on either their access networks or their core networks. NRAs need to deal with the economic problems that these changes cause for other network operators. The reasons for the changes, and the problems caused by the changes, are as follows:

- **Changes to access networks.** Fibre is installed in access networks to provide fast links and new services using IP. Access networks are more expensive to build and change than core networks; they offer less scope for infrastructure competition, so access-network operators having SMP in current markets are required to offer wholesale unbundled access (to local loops and sub-loops) and wholesale broadband access. Some network operators have argued that fibre access networks should not have to satisfy a requirement for unbundling, because that would eliminate incentives to invest.

Changing access networks into NGNs involves installing fibre from exchange buildings to street cabinets or customer premises (the choice being determined by costs and returns that differ between countries). It therefore moves points of unbundling (where local loops can be accessed) from exchange buildings to street cabinets or customer premises. If fibre access networks have to satisfy a requirement for unbundling, network operators that have used unbundled local loops from exchange buildings will need access to the new fibre. However, they may not have

good business cases for building links to street cabinets or customer premises, just to serve small numbers of customers²⁵. Moreover, street cabinets may not have enough space or power for unbundled equipment. In these circumstances, the network operators will therefore need some access to the new fibre at the exchange buildings or in the core networks. This raises questions about what regulation is appropriate to the prices paid for this access, and about what form this access should take to allow enough differentiation between services²⁶.

Even without the arguments about incentives, there are regulatory uncertainties about whether unbundling is required if fibre is extended to the customer premises. The Recommendation on Relevant Markets discusses local loops in terms of metallic access, but the Access Directive, which the Recommendation is supposed to interpret, defines local loops in a way that applies to fibre access as well as to metallic access²⁷. In the review of the NRF in 2006, the Commission did not mention revising the Recommendation to match the Access Directive and become neutral about technologies; however, it now intends to provide guidance in 2008 on regulatory principles for fibre access networks.

- **Changes to core networks.** Core networks are upgraded to provide more efficient operations and more innovative services through the complete and consistent use of IP. Core networks are often competitive already; all of them are generally expected to change to using IP fairly soon. However, they will still need to interconnect with the networks of network operators having SMP, in order to provide end-to-end delivery.

Changing core networks into NGNs is likely to involve changing the locations and functions of points of interconnection: the points of interconnection move from expensive town centres to cheap business parks, and include equipment to convert data and other traffic between the new IP formats and the existing 'traditional' formats. Here again there are problems about how to share the cost of changes between the network operators that change their core networks and the network operators that need interconnections with the core networks. These problems are reduced to some extent if the core networks can all change at the same time to using IP.

The Commission has requested ERG to provide an opinion in 2007 on the regulation of access networks in NGNs; in fact, ERG has already conducted a public consultation [30] on the topic. So far, the Commission itself has said little about NGNs, beyond some general remarks in the Staff Working Paper [31] on the revised Recommendation on Relevant Markets. It notes that:

"Incentives to upgrade the network can be attributed in part to the need for operators to make cost savings and in part to the need for them to be able to provide advanced services as voice revenues decline. The use of more efficient technology to provide existing regulated services does not alter the justification for that regulation; the move to NGNs does not

²⁵. Nonetheless, in France alternative network operators intend to provide fibre to customer premises in those metropolitan areas where Digital Subscriber Line (DSL) use is above a threshold. They expect to reduce the infrastructure costs (by 30% to 70%, it is estimated) by putting the fibre through sewers owned by the municipalities. The same operators are also planning to use wireless access in rural and remote areas. The NRA is intending to have public consultations about access to ducts and about sharing the terminal segments of fibre networks.

²⁶. For instance, if Passive Optical Networks (PONs) are used as fibre access networks, one fibre at the exchange building serves several customer premises. If each network operator would supply services to only some of those customer premises, there would need to be multiplexing of wavelengths or bit-streams to the final PON splitters. Wavelength division multiplexing for PONs is largely untried, and bit-stream access reduces the scope for service innovation.

²⁷. The fast Internet access network in Germany, and the corresponding network in the Netherlands, use VDSL with metallic access from street cabinets, so the Recommendation is relevant to them even without revision.

provide an opportunity to roll back regulation on existing services if the competitive conditions have not changed."

It goes on to comment for purposes of market review that:

"It is recognised that some market definitions may change in the face of the new service offerings that NGNs could bring. The 'all IP' network could have a knock-on effect on business models; for example, the introduction of a 'bill-and-keep' model for interconnection of voice calls on IP networks would have a major impact on the market for call termination."

In the spirit of these remarks the Commission has started infringement proceedings because of a recent law in Germany that would grant the incumbent network operator a 'regulatory holiday'. According to this law, the incumbent network operator would not be required to offer wholesale access with non-discriminatory prices on its fast Internet access network, because the retail services provided over the network would be in new markets²⁸. The Commission considers that the network would compete directly with existing networks and would therefore lie in an existing market where the incumbent network operator has to obey regulations about wholesale access; moreover, granting the regulatory holiday would be contrary to the Framework Directive, which requires that the Commission and NRAs in other member states are consulted about market definitions.

There are other member states where incumbent network operators will not get regulatory holidays and where nonetheless fibre is to be installed in access networks (as in the Netherlands) or core networks are to be upgraded (as in the United Kingdom). However, they may sometimes have weaker constraints on deployment than might be expected²⁹.

4.5.2 Implications for National Research and Education Networks

In general, NRENs should benefit from the greater availability of fibre that NGNs will provide. This may be more important to them in access networks than in core networks, as they usually already have alternative sources of fibre for core networks.

In the review of the NRF in 2006, the Commission aimed to simplify market reviews, but it said little to clarify what constitutes a new market. This lack of clarity as well as the conflict between the law in Germany and the view of the Commission reduces regulatory certainty. This is likely to decrease investment in fibre access networks in some member states.

Until there is more certainty about permissible incentives to investment in NGNs, the extent of wholesale access to NGNs will vary. In particular, NRENs will need to examine their local circumstances to see what fibre access networks are likely to be built and to what extent shared infrastructure will be available. It would be useful for NRENs to have a working group, perhaps organised through TERENA, to develop a common position on creating incentives to investment in fibre, which could be put to the Commission.

²⁸. The newness of the retail markets can be questioned. For instance, the network will deliver multiple channels of high-definition television by using VDSL, but single channels of high-definition television can be delivered by using ADSL2+ (in favourable conditions), and the step from 'single' to 'multiple' may not alter the market fundamentally.

²⁹. For instance, the incumbent network operator in the Netherlands plans to install fibre to street cabinets in order to counter competition from cable television networks (and fibre access networks owned by some municipalities). There will need to be up to 28,000 very large street cabinets; in effect the incumbent network operator will camp on public land and sell off exchange buildings. The sale of exchange buildings is important to the business case, but causes problems by removing points of unbundling. The NRA is requiring the incumbent network operator to provide the alternative network operators with economically acceptable access at points that will generally not be the street cabinets. The incumbent network operator and the alternative network operators have now agreed the principles of doing this and of providing wholesale access.

4.6 Liberalisation of radio-spectrum management

4.6.1 Developments at a European level

Radio-spectrum policy in the European Union is based on the Radio Spectrum Decision of 2002, which is intended to co-ordinate policies and uses for spectrum in the European Union. In 2005, the European Commission outlined its strategy in three Communications³⁰. It refined the strategy in the review of the NRF in 2006. The strategy, reiterated in and after the review of the NRF in 2006, now involves:

- **Allowing any technology and any service in any frequency band.** The entire spectrum used for electronic communications would be neutral about technologies (such as GSM) and services (such as mobile telephony). Owners of rights to use a frequency band would be free to provide any electronic communications service using any technology in that band. Exceptions to neutrality would be subject to appropriate public consultations, strictly justified on the basis of objectives related to general interest and limited to the extent necessary to meet the objectives. For neutrality about technologies, exceptions might ensure proper sharing of generally authorised spectrum, avoid harmful interference, or limit exposure to electromagnetic fields. For neutrality about services, exceptions might promote cultural, linguistic and media diversity, promote social, regional or territorial cohesion, avoid wasteful spectrum use or ensure safety of life.

Despite this, in 2007 the Commission made an announcement [33] supporting the use of Digital Video Broadcasting - Handheld (DVB-H) as the standard for mobile television in the European Union, with the intention of replicating the success of GSM, rather than the failure of ERMES (Enhanced Radio Messaging System). The Commission has problems in reconciling its support for DVB-H with technology neutrality and might find difficulties in persuading some NRAs to allocate the most appropriate frequency bands (which are released by the conversion from analogue to digital television) to DVB-H: although in some member states (such as Finland and Italy) mobile television uses DVB-H, in other member states (such as Germany and the United Kingdom) mobile television has been introduced using Digital Multimedia Broadcasting (DMB) or its close relative, Digital Audio Broadcasting - IP (DAB-IP), for which other frequency bands are normally requested.

- **Supporting traded, unlicensed and administratively allocated spectrum.** Spectrum trading involves buying or selling the right to use a frequency band, with the intention of balancing supply and demand more effectively than traditional administrative allocation does. Both primary trading and secondary trading in specific frequency bands would be permitted throughout the European Union³¹. Currently, thirteen member states have laws that permit secondary trading.

Spectrum trading would gradually replace traditional administrative allocation. Spectrum authorities could regain control of frequency bands from users, with fair compensation, where justified by specific objectives related to general interest. Such objectives could be the introduction of particular services throughout the European Union or the application of general authorisations throughout the European Union where technical developments so allow. They would also diminish the likelihood of spectrum hoarding. To avoid distortions of competition, existing rights would not automatically become eligible for trading.

³⁰. See [32] for overall references to these and related documents.

³¹. Primary trading relates to transactions between NRAs (or other government agencies) and potential spectrum holders. Secondary trading relates to transactions between actual spectrum holders and potential spectrum holders.

General authorisations would provide the way in which unlicensed spectrum would be made available for collective use by everyone in the European Union, subject to avoiding harmful interference and limiting public exposure to electromagnetic fields. They might extend to tactics of 'overlay' (with cognitive radio searching for temporarily vacant spectrum) and 'underlay' (with devices operating below power thresholds).

Traditional administrative allocation of spectrum would remain important when there were problems of legal certainty, interference management or public interest. However, otherwise they are seen as throttling the development of the market at a national level and in the European Union. Some military and other organisations under-use their allocations of spectrum, while new sectors may not have enough spectrum for innovative applications, and new entrants may not be able to compete with companies that were allocated spectrum some years ago.

To support its approach, between 2004 and 2006 the Commission obtained independent studies of spectrum utilisation, secondary trading and collective uses of spectrum. So far these have not led to Decisions by the Commission about spectrum trading. Nevertheless, NRAs in member states such as Ireland and the United Kingdom, which through their geographical positions have more limited problems of cross-border interference than other member states, are pressing ahead with spectrum trading. In particular, the regulator in the United Kingdom has auctioned, or is planning to auction, at least thirteen frequency bands.

- **Co-ordinating spectrum management.** A committee procedure, involving the member states and the Commission, would ensure that measures were applicable throughout the European Union and could be implemented through Decisions by the Commission³². It would deal with
 - identifying frequency bands where spectrum should be available for collective use;
 - identifying frequency bands where spectrum could be traded;
 - defining the rights of use to be bought and sold in spectrum trading;
 - ensuring the availability, accessibility and reliability of information for spectrum trading;
 - defining ways of avoiding distortions in competition when spectrum can be traded;
 - defining any exceptions to technology or service neutrality;
 - developing a common approach to authorising cross-border services using spectrum.
- **Harmonising spectrum use.** Frequency bands are to be available throughout the European Union for certain technologies and services. For example, several member states plan to let GSM frequency bands be used for other purposes and the Commission plans to have a Decision that would facilitate this consistently throughout the European Union. Harmonising their availability through Decisions by the Commission does not necessarily exclude other technologies and services from the frequency bands.

The Conference of European Postal and Telecommunications administrations (CEPT) has conducted technical studies for the European Union. Between 2005 and 2007, such activities led to Decisions by the Commission about spectrum use for local-area networks, under-used ERMES spectrum, collision-avoidance radars, short-range devices, mobile satellite services, Radio

³². There are already two official committees relevant to spectrum management: the Radio Spectrum Policy Group (RSPG) and the Radio Spectrum Committee (RSC). RSPG is an advisory committee dealing with strategic questions about spectrum management, on which it is intended to consult with interested parties such as commercial and non-commercial spectrum users. For example, it has developed opinions about spectrum trading, the switch from analogue to digital broadcasting, and technology and service neutral wireless access. RSC is an advisory and regulatory committee assisting the Commission in the development and adoption of implementation measures for the harmonisation and effective utilisation of spectrum. For example, it has been involved in Decisions by the Commission about harmonising spectrum use for particular applications, such as collision avoidance radars, short-range devices and mobile satellite services.

Frequency Identification (RFID) and Ultra-WideBand (UWB). The Commission itself has now made a proposal [34] about harmonising the uses of the frequency bands released by the conversion from analogue to digital television.

4.6.2 Implications for National Research and Education Networks

The market-led approach, with charges for existing allocations and sales of new allocations, is regarded as a way of avoiding the problems of traditional administratively licensed spectrum. In its most extreme form, it always allocates spectrum to the highest bidder, without taking into account anything other than the need to avoid interference. In particular, it does not take into account social values except where they are represented by money.

Implications of the market-led approach to spectrum for NRENs are as follows:

- **Redistributed funding.** A request for an allocation of spectrum to meet social priorities might be treated more sympathetically by the Ministry of Education than by the Ministry of Communications or the Ministry of Finance. In the market-led approach, the appropriate action would be to bid for spectrum using funds granted by the Ministry of Education; whether successful or unsuccessful, a bid would not change the funds available to government ministries as a whole, but it could redistribute them between ministries (depending on what happens to the proceeds of auctions). The attitudes and procedures of government ministries are not always well adapted to this situation.
- **Co-ordinated action.** NRENs having local coverage may need to band together to make national or even international bids for spectrum or to request traditional administrative allocations of spectrum that can be used separately in separate localities. This problem is now being encountered in the distribution to local communities of spectrum released by the conversion from analogue to digital television.
- **Collective ownership.** A market-led approach could put pressure on the availability of unlicensed spectrum. However, licensed spectrum could be made available for shared use: NRENs could bid to build 'private commons', to which participating institutions would have access provided that they did not cause interference. The 'private commons' might allow novel applications to be investigated rapidly; they could even be designated as 'innovation reserves' for exclusive use by novel applications and, if take-up was successful, opened to commercial exploitation of the applications.

NRENs may need to develop new approaches to obtaining spectrum, by co-ordinating actions nationally or internationally to ensure that their sponsors appreciate the costs and consequences of the market-led approach.

5. Conclusions

5.1 Observations

Across the European Union there remain large variations in the speed with which NRENs can expect effective regulatory action that will develop competition and reduce prices. (See Section 3.1.)

If the NREN is funded by, and reports to, a different government ministry than the one that funds the NRA and receives reports from the NRA, then the NREN is less likely to be regarded as compromising the independence of the NRA. In addition, NRENs will be better equipped than, for example, dark-fibre suppliers owned by the state to argue in public in favour of beneficial regulatory changes. (See Section 3.2.)

Many regulations govern only public networks or publicly available electronic communications services, and many NRENs are not public networks and do not support publicly available electronic communications services. However, the regulations often reflect general public opinion about what is appropriate, and the distinction between public networks and publicly funded private networks is not likely to interest critics. Thus NRENs could displease the Commission or organisations in their own countries if they do not observe good practice, matching that in the regulations governing public networks. (See Section 4.1.)

The debate about the role of ERG and the actions to regulate international roaming charges are indicative of a trend. In the European Union, it is certain that there will be increased centralisation of regulation in some respects. Increasingly, NRENs should develop shared views that can be put to the Commission. (See Section 4.2.)

5.2 Recommendations

NRENs should support, through national and international channels, the proposals put forward by the Commission (such as streamlining market reviews) that would help to reduce the variations between member states in the speed of effective regulatory action. (See Section 3.1.)

NRENs should make common cause with the organisations (typically the alternative network operators) that are pressing for the rapid implementation of simple and fair procedures for obtaining rights of way; they might present examples of good practice in regulation (such as organisational separation in the Netherlands and prior approval in the United Kingdom) for improving their own national situations. (See Section 3.3.)

NRENs should note the possibilities for public intervention, state aid and EU funding, and for working with others to aggregate demand. (See Section 3.4.)

NRENs that support VoIP services with connections to 'traditional' telephone networks should aim to fulfil obligations like those placed on PATS providers in their countries, at least for emergency calls. (See Section 3.5.)

NRENs should confirm that they, and their email service providers, are taking all the actions that can assist with suppressing spam and malevolent programs. (See Section 3.6.)

NRENs should adopt as good practice those ways of improving security that the Commission is likely to require for public networks. (See Section 4.1.)

It would be useful for NRENs to have a working group, perhaps organised through TERENA and using the work of the Article 29 Data Protection Working Party, to determine their attitude to, and appropriate implementations of, data-retention practices like those in the Data Retention Directive. (See Section 4.3.)

NRENs should ensure that their Acceptable Use Policies establish standards like those in the Audiovisual Media Services Directive. (See Section 4.4.)

It would be useful for NRENs to have a working group, perhaps organised through TERENA, to develop a common position on creating incentives to investment in fibre, which could be put to the Commission. (See Section 4.5.)

NRENs may need to develop new approaches to obtaining spectrum, by co-ordinating actions nationally or internationally to ensure that their sponsors appreciate the costs and consequences of the market-led approach. (See Section 4.6.)

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7. Acronyms

ADSL	Asymmetric Digital Subscriber Line
CENELEC	Comité Européen de Normalisation Electrotechnique
CEPT	European Conference of Postal and Telecommunications Administrations
CNSA	Contact Network of Spam Authorities
COCOM	Communications Committee
DAB-IP	Digital Audio Broadcasting - IP
DMB	Digital Multimedia Broadcasting
DSL	Digital Subscriber Line
DVB-H	Digital Video Broadcasting – Handheld
EARNEST	Education And Research Networking Evolution Study
EECMA	European Electronic Communications Market Authority
ENISA	European Network and Information Security Agency
ERDF	European Regional Development Fund
ERG	European Regulators Group
ERMES	Enhanced Radio Messaging System
ESF	European Social Fund
ETNS	European Telephony Numbering Space
ETSI	European Telecommunications Standards Institute
EU	European Union
GÉANT	Gigabit European Academic Network Technology
GN2	Multi-Gigabit European Academic Network
GSM	Global System for Mobile communications
HTTP	HyperText Transfer Protocol
ICT	Information and Communication Technology
IP	Internet Protocol
IRG	Independent Regulators Group
LAP	London Action Plan
LLU	Local Loop Unbundling
MMS	Multimedia Messaging Service
NGN	Next-Generation Network
NRA	National Regulatory Authority
NREN	National Research and Education Network
NREN	National Research and Education Networking organisation
NRF	New Regulatory Framework
OECD	Organisation for Economic Co-operation and Development
ONP	Open Network Provision
PATS	Publicly Available Telephone Service
PON	Passive Optical Network
PSTN	Public Switched Telephone Network
RFID	Radio Frequency Identification
RSC	Radio Spectrum Committee
RSPG	Radio Spectrum Policy Group
SERENATE	Study into European Research and Education Networking As Targeted by eEurope

SIP	Session Initiation Protocol
SMP	Significant Market Power
SMS	Short Message Service
SMTP	Simple Mail Transfer Protocol
UWB	Ultra-WideBand
VDSL	Very High Speed Digital Subscriber Line
VoIP	Voice-over-IP

Appendix 1

Overview

This summary is not comprehensive: it deals only with those portions of the NRF that are potentially relevant to NREs. It aims to be a simple plain-language guide to several legal documents. Any reader wishing to follow up points in this summary is strongly advised to consult the original legal documents and any subsequent clarifications.

The crucial points are that:

- The NRF applies to ‘electronic communications networks and services’. This term, invented because of convergence, is meant to remove artificial distinctions between telecommunications and broadcasting.
- The NRF excludes content regulation, which is covered by other legal documents.
- The NRF represents an evolution, not a revolution, from the status quo. It simplifies the previous large collection of Directives and other legal documents. All the Directives allow for transitional arrangements intended to avoid unjustified or unpredictable changes.
- The NRF retains the earlier twin themes of
 - fostering open competition on equivalent terms throughout the European Union;
 - harmonising national regulations when there is no objective justification for differences.
- All regulation must follow the general regulatory principles of being objective, non-discriminatory, proportionate and transparent.
- Ex-post regulation (as used in normal competition law) is to be preferred to sector-specific ex-ante regulation (which typically controls the behaviour of former monopolists). It is recognised that because of the special history of the sector, for the time being some ex-ante regulation remains justified. However, the thrust is towards reducing ex-ante regulation and eventually eliminating the need for it.
- The NRF provides a logical structure within which NRAs are meant to decide what ex-ante regulations continue to be appropriate in each member state. Regular market reviews are required to assess the status of competition in each subsector and to identify undertakings having Significant Market Power (SMP). All continuing ex-ante regulation will require justification.

The NRF comprises mainly Directives that are often (but not always) called:

- ‘the Competition Directive’ (the Directive of 16.09.02 on competition in the market for electronic communications networks and services);
- ‘the Framework Directive’ (the Directive of 7.03.02 on a common regulatory framework for electronic communications networks and services);
- ‘the Authorisation Directive’ (the Directive of 7.03.02 on authorisation of electronic communications networks and services);
- ‘the Access Directive’ (the Directive of 07.03.02 on access to, and interconnection of, electronic communications networks and associated facilities);
- ‘the Universal Service Directive’ (the Directive of 07.03.02 on universal service and users’ rights relating to electronic communications networks and services);
- the Privacy and Electronic Communications Directive’ (the Directive of 12.07.02 concerning the processing of personal data and the protection of privacy in the electronic communications sector).

The Regulation on unbundled access to the local loop could also be regarded as part of the NRF. However, it was in force already for some time before 2003 and was stated (in the review of the NRF in 2006) to become unnecessary and due for repeal when all NRAs completed their reviews of the unbundled local-loop market.

The Competition Directive

The Competition Directive essentially restates requirements that have been in place since 1990, taking in amendments made since then and using the new language.

Member states must abolish all special or exclusive rights to provide electronic communications networks and services, and must not unnecessarily restrict their provision by anyone. Any decision to prevent such provision must be on objective grounds and subject to appeal. The same applies to directory services.

Licensing is to be replaced by general authorisations, where, at most, a registration with the authorities is required. Conditions may be attached to general authorisations, but all conditions must conform to the general regulatory principles (and be within the maximum set permitted by the Authorisation Directive described later in this Appendix). Any required contributions (in cash or in kind) to achieving universal service objectives must be in accordance with the principles and designed to minimise distortion of competition.

Spectrum and satellite space segments are to be allocated in accordance with the general regulatory principles and in conformity with competition law.

Vertically integrated concerns having SMP (which are normally incumbent network operators) must be prevented from discriminating in favour of their own operations. Cable television networks run by incumbent network operators must be in legally separate entities, at any rate until there is adequate competition in the provision of local networks.

The Framework Directive

The Framework Directive starts with important definitions that apply throughout the legislation. Among them are:

- An “electronic communications service” means a service *normally provided for remuneration* that consists wholly or mainly in the conveyance of signals on electronic communications networks.
- A “public communications network” means an electronic communications network used wholly or mainly for the provision of *publicly available* electronic communications services.
- A “user” means someone using or requesting a publicly available electronic communications service.

The terms in italics are not further defined.

Each member state must establish a National Regulatory Authority (NRA) that is independent both of the industry and of any branch of government involved in ownership of any industry participant. The NRA must be adequately funded to fulfil its role, and there must be an avenue for appeal against its decisions. It must

- regulate impartially in accordance with the EU principles and in a technology-neutral way;

- consult openly on all regulatory decisions;
- co-operate with its own national competition authority and with its counterparts in other member states;
- obtain such information from the industry as is necessary, but without imposing undue burdens, and respect commercial confidentiality where requested.

The overall objective for NRAs is to promote competition and the smooth functioning of the internal market. Supporting objectives include

- promoting the interests of users, and especially of disabled users;
- providing for universal service and consumer protection;
- encouraging investment and innovation;
- encouraging efficient use of spectrum and numbering resources;
- encouraging the establishment and interoperability of trans-European networks;
- maintaining the security and integrity of public communications networks.

The necessary but limited resources of radio frequencies, numbering, rights of way and co-location and facility sharing are to be made available, within their natural limits, to all applicants on fair and equal terms. However, the procedures for granting rights of way may favour public communications networks; co-location and facility sharing are the preferred course where environmental and other considerations preclude new construction.

Radio spectrum must be managed in a harmonised way, under the oversight of the Radio Spectrum Committee (RSC) (set up by the Radio Spectrum Decision, at the same date), and as far as possible in co-ordination with the broader grouping of the European Conference of Postal and Telecommunications Administrations (CEPT). CEPT receives mandates from the Commission, advised by RSC. A further Decision sets up the Radio Spectrum Policy Group (RSPG) on which there are representatives of member states and observers from CEPT. RSPG is purely an advisory committee, but RSC is also a regulatory committee acting for the Council of Ministers.

Historic incumbent network operators must adopt separate accounting and reporting procedures for their electronic communications network and service activities.

Through market reviews, NRAs must identify undertakings having SMP in specific markets. SMP (which is similar to dominance) means occupying 'a position of economic strength affording it the power to behave to an appreciable extent independently of competitors, customers and ultimately consumers'. Market reviews are to be carried out 'with utmost regard for' Guidelines by the Commission.

The markets for review will be limited to those identified in a Recommendation on Relevant Markets, which is intended to be reviewed regularly. The list of markets is:

- Retail level:
 - access to the public telephone network at a fixed location for residential customers;
 - access to the public telephone network at a fixed location for non-residential customers;
 - publicly available local and/or national telephone services provided at a fixed location for residential customers;
 - publicly available international telephone services provided at a fixed location for residential customers;

- publicly available local and/or national telephone services provided at a fixed location for non-residential customers;
- publicly available international telephone services provided at a fixed location for non-residential customers;
- the minimum set of leased lines (which comprises the specified types of leased lines up to and including 2 Mb/s).
- Wholesale level:
 - call origination on the public telephone network provided at a fixed location;
 - call termination on individual public telephone networks provided at a fixed location;
 - transit services in the fixed public telephone network;
 - wholesale unbundled access (both full access and shared access) to metallic loops and sub-loops for providing broadband and voice services;
 - wholesale broadband access offering bidirectional bit-stream access (or equivalent facilities over other infrastructures);
 - wholesale terminating segments of leased lines;
 - wholesale trunk segments of leased lines;
 - access and call origination on public mobile telephone networks;
 - voice-call termination on individual mobile networks;
 - wholesale national markets for international roaming on public mobile networks;
 - broadcasting transmission services, to deliver broadcast content to end-users.

Some of these markets may be segmented; in particular, the terminating leased-line market can be segmented according to bandwidth.

NRAs must require or encourage the adoption of various standards, originating mainly from the European Telecommunications Standards Institute (ETSI) and the European Committee for Electrotechnical Standardization (CENELEC). A list of these standards appears in the EU Official Journal and is updated from time to time (and so are lists of standards for other subjects). It covers:

- Compulsory standards:
 - minimum set of leased lines (64 kb/s and 2 Mb/s);
 - PSTN quality-of-service parameters.
- Voluntary standards:
 - higher speed leased lines (up to 155 Mb/s);
 - access and interconnection;
 - number portability;
 - carrier selection and pre-selection;
 - unbundled local-loop access;
 - various user services;
 - data protection;
 - digital broadcasting distribution;
 - digital interactive television.

NRAs must put in place procedures for resolving inter-industry disputes in less than four months, and co-operate with each other to resolve cross-border disputes equally promptly.

NRAs must work with, and supply information to, the Commission, which will be supported and advised by the Communications Committee (COCOM). A related Decision sets up the European

Regulators Group (ERG), composed of the heads of all NRAs affected by these Directives, which is to work closely with COCOM. ERG is purely an advisory committee, but COCOM is also a regulatory committee acting for the Council of Ministers.

The Commission can require NRAs to withdraw decisions that determine which undertakings have SMP where the decisions would affect trade between member states.

The Authorisation Directive

The Authorisation Directive aims to simplify and harmonise the currently varied licensing and authorisation regimes among member states. Simple, cheap authorisation to provide electronic communications networks and services is the norm, and any departure from that norm must be justified.

Authorisation may require notification to the NRA, and the provision of minimal necessary information, but must not entail any delay in activities. It automatically confers the right to provide services to the public and to negotiate interconnection with other authorised providers of public communications services, as well as to set up networks and apply for rights of way. Authorisation also entitles the provider to apply for, and be granted where possible, numbers (within two weeks) and radio frequencies (within six weeks). These resources may be granted for limited durations only.

All these rights may be affected by the following constraints:

- There may be fees and charges to cover administrative costs or to create incentives for optimal use of limited resources.
- Entitlement to provide service may be subject to conditions covering:
 - universal service funding contributions and consumer protection rules, including data protection;
 - interoperability and interconnection, including accessibility of numbers to end-users and the protection of network integrity;
 - transmission of public broadcasting content and protection of minors from illegal or harmful content;
 - protection of the environment, public safety and national security.
- Rights of use of limited resources may be subject to conditions covering:
 - use for specific identified service and in compliance with undertakings made by the applicant;
 - efficient use of the resource;
 - avoidance of radio interference and compliance with international obligations;
 - number portability and provision of public directory information.

In addition to the general conditions, specific conditions may be imposed on particular undertakings (which are usually those having SMP) under the Access Directive or the Universal Service Directive.

NRAs may request information from authorised undertakings to verify compliance with all the conditions. If breaches are found, reasonable and proportionate enforcement measures should be employed, with a right of appeal.

The Access Directive

The Access Directive gives two important definitions. They are:

- “access” means making available to another undertaking facilities and services such as network elements, buildings, ducts, masts, or software systems;
- “interconnection” means the physical and logical linking of networks to enable users of both networks to communicate with each other, or with services on the other network.

Access in the sense of the Access Directive represents a different concept from access by end-users to an (access) network, which tends to be discussed in the Universal Service Directive. Interconnection in the sense of the Access Directive is a specific sort of access between network operators.

The norm is for all authorised public communication network providers to negotiate and agree on terms for access and interconnection. In case of difficulty, the NRA may intervene at the request of either party or on its own initiative.

In defined markets (given as the list ‘wholesale level’ in the remarks above about the Framework Directive), following market review, NRAs may impose access and interconnection obligations on undertakings having SMP. These obligations include:

- transparency (through publishing a sufficiently unbundled Reference Interconnection Offer, for example);
- non-discrimination;
- access to particular network facilities, in a fair, reasonable and timely manner;
- accounting separation and cost accounting requirements, including publication of internal transfer prices;
- price controls (which may include a requirement for cost-orientation).

SMP providers of public telephone networks can be obliged to provide unbundled access to the local loop and a Reference Unbundling Offer. A local loop is ‘the physical circuit connecting the network termination point at the subscriber’s premises to the main distribution frame or equivalent facility in the fixed public telephone network’, so it is not specifically metallic.

A detailed list of required elements and conditions for Local Loop Unbundling (LLU) and co-location appears in an Annex to the Directive. It includes sub-loops as well as loops, and covers both full access and shared access, where:

- with full access, the owner of the loop remains responsible for maintenance, but a different service provider provides all services to the subscriber (inside and outside the voice-band frequencies);
- with shared access, the owner of the loop remains responsible for maintenance and provides some services to the subscriber, but a different service provider provides other services (outside the voice-band frequencies).

Conditional access systems for digital television must be managed in a way that is fair to all broadcasters.

The Universal Service Directive

The Universal Service Directive aims to preserve or improve standards of consumer protection in the sector, and to deal with circumstances where needs are not met by the market.

Of particular importance are the notions of a Publicly Available Telephone Service (PATS) and of a public telephone network (which is an electronic communications network that is used to provide a PATS). A PATS is a service available to the public for originating and receiving national and international calls and access to emergency services through numbers in a national or international telephone numbering plan. PATS providers must make available to the universal directory the numbers of all of their subscribers who wish to be mentioned in the directory. PATS providers at fixed locations must take reasonable steps to provide uninterrupted access to emergency services.

Throughout their territory, member states must ensure PATS provision at fixed locations, on lines having sufficient quality to permit 'functional' Internet access and meeting other quality-of-service targets. Other universal service obligations include a universal directory, directory enquiry service, enough public payphones to meet reasonable needs, special measures for disabled users and 'affordability' tariff options. At least one operator must be designated to fulfil each obligation. Where the net cost of fulfilling an obligation is shown (by transparent calculations carried out as prescribed in an Annex) to be an unfair burden on the designated operator, it may be reimbursed by government or shared on an equitable basis across the industry.

SMP providers of public telephone networks must remain subject to retail-price regulation (with a view to achieving cost-oriented tariffs) for as long as necessary to foster competition and protect consumers. The minimum set of leased lines (up to 2 Mb/s) must continue to be made available at cost-oriented prices for as long as market conditions make this necessary.

Users of public telephone networks (and PATS users, in general) have rights to clear contracts, itemised billing, selective call barring, prepayment, knowledge of applicable tariffs, published quality-of-service information, operator assistance and directory enquiry services, ability to use the emergency number 112 free of charge from any telephone, and number portability (for both fixed and mobile service). In addition, tone dialling and calling line identification must be provided unless the NRAs decide that there is already enough access to these facilities.

Providers of public telephone networks must adopt the standard international dialling prefix 00 and must handle calls to the European Telephony Numbering Space (ETNS).

SMP providers of public telephone networks at fixed locations must provide carrier selection facilities, both call-by-call selection and pre-selection, for PATS access. Pricing for number portability and carrier selection must be cost-oriented.

The Privacy and Electronic Communications Directive

The Privacy and Electronic Communications Directive aims to restrict the processing and retention of personal data by providers of public communications networks and services, so as to protect personal privacy in a way that is consistent with other EU legislation. The general principle is that the users should be aware of, and should consent to, any use of their personal data. Exceptions are permitted for emergencies, for criminal investigations and in the interests of national security.

Special provisions apply to traffic data, location data, itemised billing, calling line identification, automatic call forwarding and directories.

Unsolicited commercial communications, including email messages, are prohibited on an opt-in basis or an opt-out basis; the choice between an opt-in basis and an opt-out basis is left to each member state, except for automated electronic communications to people (as opposed to organisations), where it must be on an opt-in basis. Unsolicited email messages that hide the identities of the senders or exclude return addresses for cancelling future messages are prohibited in any case.

Users of terminals must be told about the purposes of storing information on, or retrieving information from, their terminals and must be able to prevent storage and retrieval.

