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FINAL RSPG OPINION

REQUEST BY THE EUROPEAN COMMISSION TO THE RADIO SPECTRUM POLICY GROUP FOR AN OPINION ON

BEST PRACTICES REGARDING THE USE OF SPECTRUM BY SOME PUBLIC SECTORS

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Final Opinion

1. Introduction

This paper represents the response of the Radio Spectrum Policy Group (RSPG) to the Request for an Opinion on best practices regarding the use of spectrum by some public sectors.

Public sector bodies are very significant users of radio spectrum, both for historical reasons (they often were the first to deploy new radio technologies, for instance for safety and defence purposes), but also because the services they provide continue to be high priorities for governments, whether delivered at national, regional or local/municipal level. A range of services has a clear international dimension, as they require coordination and interoperability between countries (on a global basis in the case of aviation and shipping).

Typically, assignment of radio spectrum for public use is implemented through "command and control" mechanisms and sometimes public sector assignees tend to view spectrum assignments as permanent and costless. In a number of domains, such as civil aviation, maritime and scientific services, allocation of spectrum is harmonised at global level and can only be modified by decisions of World Radiocommunication Conferences. Some spectrum is also harmonised at a regional level. However, assignment of spectrum for public use is decided on a national basis. Although in some cases public sector bodies do increase spectrum efficiency by sharing spectrum between several of their applications, this approach does not necessarily ensure sufficient incentives for public sector bodies to make maximally efficient use of their spectrum assignments, or to give spectrum back to the spectrum management authority if they no longer need it. On the contrary, it may create an incentive for public sector organisations to seek spectrum resources beyond their needs for current use and to hoard spectrum for possible future use, which they may, or may not, need for new or enhanced applications. On the other hand, spectrum licensed for exclusive non-public use in Europe is generally assigned through competitive or comparative mechanisms such as auctions or beauty contests, and it may be subject to trading in a secondary market after initial assignment.

The objective of this Opinion is to identify best practices for a more efficient use of spectrum by public sector bodies in the areas of defence, emergency and public safety and public transport, with a view to assist spectrum management authorities in Member States to ensure that such public sector bodies have sufficient and appropriate spectrum resources to perform their tasks effectively and that scarce radio frequencies are not underutilised. The objective is not to recommend a single best practice on one issue but rather, where possible, to identify a number of best practices, which should not be perceived as necessarily being mutually exclusive. Due consideration is also given in identifying appropriate means of fostering a more efficient management of spectrum allocated to public services, and the relationship of this activity with overall spectrum policy goals, in the light of the different existing competences concerning the public sectors under study.

2. Overview of Public Use of Spectrum

2.1 Introduction

Spectrum is used by a wide range of public sector bodies. These public sector bodies fulfil general interest objectives. They use, or regulate the use of, radio spectrum in various domains such as defence, public broadcasting, scientific research, emergency safety (police, fire, ambulance, coastguard), public transport (including aviation and shipping), radio navigation by satellite, education, health care and disability.

This Opinion of the RSPG concentrates on the following three public sectors which are being examined within the existing institutional framework:

- Defence (within the Common Foreign and Security policy framework).
- Emergency and Public Safety service including PPDR[1] (police, fire, ambulance, coastguard, civil protection).
- Public transport (in its various modes of operation).

The focus on these domains takes into account that RSPG has already undertaken activities of relevance to other areas of public use of spectrum (broadcasting, scientific use of spectrum), in particular with its Opinions on spectrum usage by scientific services (RSPG06-144) and broadcasting (RSPG06-143 and RSPG04-55). This section describes in broad terms the radio services operated by the above public sectors.

In a typical EU country[2] the public sector accounts for nearly half of the radio spectrum in the frequency range 108 MHz - 6 GHz, including 27.2% for defence, 20.7% for transport (including civil aviation and maritime sectors), 0.9% for emergency services and 1.4% for other public sectors. It should be noted, however, that some of this spectrum is being shared between several public sectors (e.g. radars) or with electronic communication services (e.g. RLAN).

Demand for spectrum for non-public services, as well as for military and other public sector applications, is growing below 15 GHz, especially below 3 GHz for mobile applications. Shortages of spectrum are likely to prevent new communications services and technologies from being introduced and hold back innovation, competition and growth to the detriment of European citizens and consumers and damage the international competitiveness of the European single market.

2.2 ITU World Radiocommunication Conferences

Global allocations of radio spectrum are agreed at the ITU[3] World Radiocommunication Conferences (WRC) for each ITU Region and incorporated in the Radio Regulations. Outcomes of WRCs have treaty status and the international harmonisation is essential for many public sector services such as transport. In Europe, common positions in relation to WRC agenda items are developed by the European Conference of Postal and Telecommunications Administrations (CEPT) that includes 48 European member states.

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[1] Public Protection and Disaster Relief

[2] Public Workshop on Optimizing the Use of the Radio Spectrum by the Public Sector in the EU, 1/4/2008, "Application and Technologies", by John Burns, Aegis Systems Ltd.

[3] International Telecommunication Union

The European Commission provides political guidance for this process following RSPG Opinions inter alia via Communications to the European Parliament and Council.

It is noted that national radiocommunication authorities are responsible for spectrum assignments in their own countries, which could even be in derogation of the international allocations, provided such assignments do not cause harmful interference to another state's assignments operating in accordance with the Radio Regulations.

2.3 Spectrum Use by the Public Sectors Concerned

The following paragraphs summarise current use of spectrum by public sector bodies and Annex 1 summarises some of the international organisations which influence the way these bodies use spectrum to deliver services.

2.3.1 Defence

In the defence sector the frequency spectrum is mainly used for communication purposes, radars and point to point links. Communications include both voice and data communications. Radars include ground radars, airborne radars and ship radars. There is also some spectrum use for satellite communications. Military applications make use of radio spectrum for command, control, navigation, communications and information systems, intelligence gathering, surveillance, reconnaissance and targeting etc. Although defence use of spectrum is often similar to non-defence use in terms of service, the defence sector when using spectrum during crisis situations, under constraint and hostile conditions, generally requires particular quality of service and availability.

The total amount of spectrum assigned for defence use in the EU Member States ranges from 1 GHz to 3.5 GHz. The amount of spectrum shared with other services varies from country to country. On average, around 50% of the spectrum used for defence is currently shared with other services. In general, the spectrum used by the defence sector could be quantified as follows:

(a) In some countries, the defence sector uses some spectrum (a few MHz) for PMR applications within the harmonised PMR band.
(b) A few hundred MHz of spectrum is used for radionavigation and radiolocation
(c) In some countries, defence spectrum may be assigned on a temporary basis mainly for electronic communication applications.
(d) The defence sector shares a significant amount of spectrum with Civil Aviation (about 1 GHz) for radionavigation, radiolocation and air traffic control communications.
(e) The defence sector also shares around 600 MHz of spectrum (on a permanent or temporarily basis) with electronic communications services (including RLAN).
(f) Also, the defence sector shares spectrum, on a permanent or temporary basis, with other users.

In NATO[4] member countries, the use of spectrum by the defence sector is, where possible, harmonised and set out within the NATO joint civil/military frequency agreement. Use below 6 GHz could be quantified as follows:

[4]North Atlantic Treaty Organisation; not all EU Member States are members of NATO.

(i) NATO member countries should have designated spectrum between 90 and 180 MHz in the band 1350-2690 MHz for tactical radio relay. However the designated spectrum is not harmonised, and is sometimes shared.
(ii) Approximately 150 MHz of spectrum in the frequency range 225-400 MHz is managed by NATO.
(iii) 590 MHz of spectrum in the band 4400-4990 MHz should be used, exclusively or not, for defence applications and harmonised at NATO level. It is a major band for defence and it should be noted that this spectrum is shared by a number of defence applications in different ITU services.

2.3.2 Emergency and Public Safety Service

Emergency and public safety service organisations (E&PSS) provide the community with indispensable police, fire and other emergency services. These services usually use spectrum for communication purposes, including satellite communications and point to point links. Emergency and public safety service operations require wireless access, while on the move. Because of the nature of the activities, these networks have to be secure, reliable, resilient and available across a wide geographic area regardless of population density.

Europe has taken several measures to ensure that emergency and public safety service organisations have the communications resources they need. In 1996, CEPT with Decision ERC/DEC/(96)01 designated the frequency bands 380-385 MHz and 390-395 MHz to be used by Digital Land Systems for emergency services under specified conditions, while with its Decision ERC/DEC/(96)04 CEPT identified specific frequency bands for the introduction of Trans European Trunked Radio System (TETRA) for civil applications throughout Europe. This resulted in widespread adoption of Europe-wide PSS communications systems using either TETRA or Tetrapol. In addition to the designation of frequencies for emergency services, CEPT further complemented ERC/DEC/(96)01 with Decisions ERC/DEC/(01)19 and ECC/DEC/(06)05 which designated specific frequencies, within the identified frequency bands, for the use of Direct Mode Operation (DMO) both nationally and for cross-border operation and for the harmonised use by airborne applications, respectively. Moreover, in 2008 CEPT adopted ECC Decision ECC/DEC/(08)05 (which replaced Decision ERC/DEC/(96)01) on the harmonisation of frequency bands for the implementation of digital Public Protection and Disaster Relief (PPDR) radio applications in bands within the 380-470 MHz range.

In order to fulfil their obligation to save lives and property, E&PSS organisations and their personnel require wireless access not only to voice and simple data services (narrowband) but also increasingly to broadband data services. The ability to utilise broadband services requires more spectrum than the two 5 MHz-wide blocks currently harmonised across Europe. With this in mind, CEPT developed ECC Recommendation 08-04 on “The identification of frequency bands for the implementation of Broad Band Disaster Relief (BBDR) radio applications in the 5 GHz frequency range” which recommends that administrations should make available at least 50 MHz of spectrum for digital BBDR radio applications. However, this spectrum is shared with radio LANs and should be available for disaster relief during major incidents.

2.3.3 Public Transport

2.3.3.1 Land Transport

In the land transport sector, the radio frequency spectrum is being used for communication purposes (voice and data communications) including satellite communications.

Intelligent Transport Systems (ITS) and Road Transport and Traffic Telematics (RTTT) communications systems are essential elements of the transport infrastructure in Europe. RTTT systems such as mobile data links between vehicles and between vehicles and the roadside infrastructure are required for various applications including automatic toll-collection, route guidance and collision avoidance. RTTT systems are implemented in the frequency bands 5795-5805 MHz, 63-64 GHz and 76-77 GHz. Besides RTTT systems, ITS systems are also central to an integrated approach in road safety by adding information and communication technologies (ICT) to transport infrastructure and vehicles so as to avoid potentially dangerous traffic situations and reduce the number of accidents. The frequency band 5875-5905 MHz is harmonised for the implementation of safety related applications of ITS in the Community (EC Decision 2008/671/EC and ECC Decision ECC/DEC/(08)01) and an ECC Decision is also being developed for the harmonisation of the frequency band 63-64 GHz for the implementation of ITS. Moreover, GSM-R is the radio technology used for railway communications to exchange voice and data information between train and railway regulation control centres. In Europe, GSM-R uses the bands 876-880 MHz (uplink) and 921-925 MHz (downlink).

2.3.3.2 Aeronautical Transport

In the aeronautical transport sector spectrum is being used extensively for ground and airborne radars and for navigational aids. Moreover, spectrum is also used for communication purposes (voice and data communications) and for satellite communications. Safety is the top priority for aviation and its systems are developed and used in accordance with international obligations and standards under the ITU and ICAO[5]. The high integrity of these systems must be maintained and harmful interference cannot be accepted.

The total of spectrum used by civil aviation is about 1 GHz, which represents 20% of the spectrum below 6 GHz. Civil aviation shares 96% of its spectrum with others users, particularly with the defence sector and also with meteorology and electronic communications, primarily for the same service.

2.3.3.3 Maritime Transport

In the maritime transport sector spectrum is being used extensively for ground and ship radars. Moreover, spectrum is also used for communication purposes (voice and data communications), for satellite communications and for navigational aids.

In the ITU Radio Regulations a total of 4.8 MHz of bandwidth in the MF, HF, and VHF bands is identified for exclusive use by the maritime mobile services. Besides this, ship

[5] International Civil Aviation Organisation

and shore based radars are employed extensively in the maritime sector to ensure safe operation. There are two principal radar bands, the S-band (2900-3100 MHz) and the X-band (9200-9500 MHz). The total amount of spectrum assigned for maritime use in the EU Member States ranges from 200 MHz to 700 MHz. In most EU Members States the entire spectrum assigned for maritime use is shared with other sectors, almost always for the same applications.

3. EU Sectoral Policies

3.1 Introduction

The competences of the European Commission in spectrum policy are laid down in the Radio Spectrum Decision 676/2002/EC[6] which complements the regulatory framework for electronic communications. The purpose of this Decision was to establish a policy and legal framework in the European Community in order to coordinate and support the radio spectrum needs of EU policies and initiatives necessary for the functioning of the internal market in Community policy areas such as electronic communications, transport, research and development.

Recital (9) of the Radio Spectrum Decision says that this Decision should not affect the right of Member States to impose restrictions necessary for public order and public security purposes and defence. Where a technical implementing measure would affect inter alia radio frequency bands used by a Member State exclusively and directly for its public security and defence purposes, the Commission may, if the Member State requests it on the basis of justified reasons, agree to transitional periods and/or sharing mechanisms, in order to facilitate the full implementation of that measure. In this regard, Member States may also notify the Commission of their national radio frequency bands used exclusively and directly to pursue public security and defence purposes.

Recital (8) of the Radio Spectrum Decision says that increasing demand for spectrum will lead to conflicting pressures to accommodate the various groups of radio spectrum users in sectors such as telecommunications, broadcasting, transport, law enforcement, military and the scientific community. Therefore, radio spectrum policy should take into account all sectors and balance their respective needs.

3.2 Common Foreign and Security Policy (CFSP)[7]

The CFSP was established as the second pillar of the European Union in the 1993 Treaty on European Union signed at Maastricht. A number of important changes were introduced in the Amsterdam Treaty which came into force in 1999. It has been agreed to embark on a common security and defence policy (CESDP) within the overall framework of the CFSP.

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[6] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2002:108:0001:0006:EN:PDF

[7] EU sectoral policies on defence do not exist as such. In this paragraph some committees within the Council (EUMC, EUMS) which deal with military matters (related to 2nd pillar of the EU), are mentioned.

The Amsterdam Treaty specifies five fundamental objectives of CFSP:

(1) to safeguard the common values, fundamental interests, independence and integrity of the Union in conformity with the principle of the United Nations Charter;
(2) to strengthen the security of the Union in all ways;
(3) to preserve peace and strengthen international security, in accordance with the principles of the United Nations Charter, as well as the principle of the Helsinki Final Act and the objectives of the Paris Charter, including those on external borders;
(4) to promote international co-operation;
(5) to develop and consolidate democracy and the rule of law, and respect for human rights and fundamental freedoms.

The Amsterdam Treaty introduced a new office of High Representative (HR) for CFSP. This office is merged with that of Council Secretary General. A Policy Planning and Early Warning Unit has been set up within the Council Secretariat. Its mandate includes monitoring, analysis and assessment of international developments and events, including early warning on potential crises.

The following committees have been established within the Council to enhance the implementation of the CFSP:

- The European Union Military Committee (EUMC) is composed of the Chiefs of Defence represented by their military representatives. The EUMC is responsible for providing the Political and Security Committee (PSC) with military advice and recommendations on all military matters within the EU.
- The European Union Military Staff (EUMS) within the Council structures provides military expertise and support to the CESDP, including the conduct of EU-led military crisis management operations.
- The Politico-Military Group examines the politico-military aspects of all proposals within the framework of the CFSP.
- The Committee for Civilian Aspects of Crisis Management gives advice on the political aspects of non-military crisis management, conflict prevention etc.

3.3 Road Transport

The Community policy objectives for road transport are to promote efficient road freight and passengers transport services, to create fair conditions for competition, to promote and harmonise safer and more environmental friendly technical standards, to ensure a minimum fiscal and social harmonisation and to make sure that the rules in road transport are effectively applied without discrimination.

A big challenge in road transport is improving the road safety. The safety of all road users, as well as the efficiency of road transport, can potentially be improved using Intelligent Transport Systems and Services (ITS). The purpose of ITS is to add information and communications technology to transport infrastructure and vehicles. The systems within the ITS concept based on bi-directional communications both between

vehicles (a.k.a. vehicle-to-vehicle, V2V or inter-vehicle communication, IVC) and between vehicles and roadside units (a.k.a. vehicle-to-infrastructure, V2I or roadside to vehicle, R2V) with general infrastructure access are also called Intelligent Co-operative Systems. To facilitate the implementation of such systems in Europe, the Commission adopted a Decision[8] on the harmonised use of radio spectrum in the 5875-5905 MHz frequency band for safety-related applications of ITS in August 2008.

Safety related ITS applications contribute to the general EU policies aimed at reducing road accidents and fatalities in Europe. The goal of the European Union's *e*Safety Initiative[9] is to reduce the fatalities by 50% by 2010 from the 2001 level by improving the efficiency and safety of road traffic and promoting the use of information and communication technologies (ICT) in intelligent transport solutions. A number of elements in the domain of intelligent vehicles are addressed by the Intelligent Car Initiative[10, 11] which is a flagship project within i2010 - "A European Information Society for growth and employment" initiative[12]. ITS can potentially bring social and economic benefits in terms of improving road safety. Innovative road safety technologies include anti-collision automotive short range radars (SRR) for the use of which spectrum is already harmonised in the 79 GHz and 24 GHz bands[13].

3.4 Air Transport

Air transport makes a key contribution to the European economy, with more than 130 scheduled airlines, a network of over 450 airports, and 60 air navigation service providers.

The Single European Sky is an initiative to reform the architecture of European air traffic control to meet future capacity and safety needs. The goal is to improve air traffic management (ATM). The Air Traffic System ensures the safe and smooth organisation of air traffic in our airspace. In addition to the core air traffic control services, it consists of a range of other services, such as meteorological, communications, surveillance or aeronautical information services. The Single European Sky legislation brings competence to air traffic management at Community level.

The use of spectrum by air transport mainly concerns ATM. ATM systems are under the scope of the interoperability Regulation 552/2004 as well as of the RTTE Directive 1999/5/EC. Spectrum issues are addressed in section (17) of Regulation 552/2004:

(17) Within the framework of the relevant Community legislation, due account should be taken of the need to ensure:

- *harmonised conditions with regard to the availability and efficient use of radio spectrum necessary for the implementation of the Single European Sky, including electromagnetic compatibility aspects;*
- *protection of the safety-of-life services from harmful interference;*

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[8] See Commission Decision 2008/671/EC of 5.8.2008
[9] http://ec.europa.eu/information_society/activities/esafety/index_en.htm
[10] COM(2007)541 of 17.9.2007: the First Intelligent Car report
[11] http://ec.europa.eu/information_society/activities/intelligentcar/index_en.htm
[12] COM(2007)146 of 30.3.2007: i2010Annual Information Society report 2007
[13] See Commission Decisions 2004/545/EC of 8.7.2004 (79 GHz) and 2005/50/EC of 17.1.2005 (24 GHz)

- *efficient and appropriate use of frequencies allocated to and managed exclusively by the aviation sector."*

Also in the last paragraph of the essential requirement Safety in Annex II:

"Systems shall be designed, built, maintained and operated using the appropriate and validated procedures, in such a way as to be free from harmful interference in their normal operational environment."

In order to improve the efficient use of spectrum, an implementing rule on voice channel spacing was adopted by the Commission regulation (EC) No 1265/2007 of 26 October 2007 laying down requirements on air-ground voice channel spacing for the Single European Sky.

On 25 June 2008, the Commission adopted the 2nd package of the Single European Sky (SES II):

- Commission's Communication[14] on the Single European Sky II;
- Proposal[15] for a Regulation amending Regulations (EC) No 549/2004, (EC) No 550/2004, (EC) No 551/2004 and (EC) No 552/2004 in order to improve the performance and sustainability of the European aviation system;
- Proposal[16] for a Regulation amending Regulation (EC) No 216/2008 in the field of aerodromes, air traffic management and air navigation services and repealing Council Directive 06/23/EEC.

3.5 Maritime Transport

Maritime transport is of fundamental importance to Europe and the rest of the world. Over 90% of European Union external trade is transported by sea and more than 3.7 billion tonnes of freight a year are loaded and unloaded in EU ports. This means that shipping is the most important mode of transport in terms of volume. Furthermore, as a result of globalisation, maritime transport will continue to be the most important transport mode in developing EU trade for the foreseeable future.

Attention is paid to developing an efficient multimodal logistic in Europe using long and short sea journeys, rail and inland waterways as well as road. Transfer of goods via different modes has the potential to be cost-effective and sustainable, boosting both Europe's economy and environment.

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14 http://ec.europa.eu/transport/air_portal/traffic_management/ses2/doc/communication/com_2008_0389_1_communciation_en.pdf

15 http://ec.europa.eu/transport/air_portal/traffic_management/ses2/doc/communication/com_2008_0388_1_proposal_regulation_en.pdf

16 http://ec.europa.eu/transport/air_portal/traffic_management/ses2/doc/communication/com_2008_0390_1_proposal_regulation_en.pdf

EU action in the field of maritime safety and protection of the environment generates added value to the international framework (IMO[17] conventions). The transposition of IMO rules into the EU legal system ensures their enforcement across the entire European Union. In addition, when feasible, the EU plays an important role in improving international standards by adopting stringent requirements regionally and then promoting their adoption at international level.

The EU has been active in legislating to improve security at ports and at sea, to complement international efforts in this important area. IMO adopted a new Chapter XI-2 in its Convention on Safety of Life at Sea (SOLAS) and the International Ship and Port Facility Security (ISPS) Code. The ISPS Code includes detailed requirements for governments and port authorities to improve security at port facilities, based on security assessments and plans covering issues such as cargo monitoring, inspection and control of access. In support, the Commission adopted a regulation on enhancing ship and port facility security. The aim is to protect ships and ports from terrorism; it incorporates the ISPS Code into European law and extends its application to domestic operations with the EU.

3.6 Rail Transport

The construction of a safe and modern integrated railway network is one of EU's major priorities. The increasing transport demands, as a result of the creation of the internal market with its four fundamental freedoms provided for in the Treaty, as well as the increasing shortage in adequate transport supply due to major bottlenecks in the European infrastructure, made it necessary to integrate the rail systems of the Member States into one European rail system.

The European Rail Traffic Management System (ERTMS) is a major industrial Europe-wide project, which has been set up by the European railways and the supply industry supported by the European Commission to create unique signalling standards throughout Europe. It aims at making rail transport safer and more competitive. One component of ERTMS, the European Train Control System (ETCS), guarantees a common standard that enables trains to cross national borders and enhances safety.

One of two basic components of ERTMS is GSM-R, the radio technology used for railway communications to exchange voice and data information between train and railway regulation control centres. In Europe, GSM-R uses the bands 876-880 MHz (uplink) and 921-925 MHz (downlink). The European Railway Agency acts as the system authority for ERTMS.

3.7 Satellite Navigation

Global Navigation Satellite Systems (GNSS) allow users worldwide to pinpoint their locations or the locations of objects, other people and goods at any given moment. The range of possible uses for this sort of capability is enormous, spanning many domains, both public and non-public, from more transport and logistics to communication applications, land surveying, agriculture, fisheries, environmental protection, scientific research, tourism and leisure, and others. Satellite navigation can relieve traffic

[17] International Marine Organisation

conditions by improving the efficiency of vehicle use. It can guide people with disabilities or locate shipments, animals and containers. It can facilitate civil protection operations in harsh environments, speed up rescue operations for people in distress, and provide tools for coastguards and border control authorities. It is also a potential instrument for 'time stamping' of financial transactions, scientific research in meteorology, geodesy, ground movement monitoring and many other activities.

GALILEO, the European GNSS system, will be under full civilian control. With its full satellite constellations, GALILEO will allow positions to be determined more accurately even in urban areas where buildings obscure signals from today's satellites. GALILEO will also offer several signal enhancements making the signal more easy to track and acquire and more resistant against interference and reflections. GALILEO and EGNOS[18] will make possible a whole new and virtually limitless range of 'reliability-critical' services, applications and business opportunities.

3.8 Public Protection and Disaster Relief

Public Protection (PP) radio communications are used by responsible agencies and organisations dealing with maintenance of law and order, protection of life and property, and emergency situations.

The Schengen Agreement enables greater freedom of movement of persons and introduces measures needed to maintain and reinforce the level of security.

Article 44 of the Convention implementing the Schengen Agreement of 14 June 1985 states:

1. In accordance with the relevant international agreements and account being taken of local circumstances and technical possibilities, the contracting parties shall install, in particular in border areas, telephone, radio, and telex lines and other direct links to facilitate police and customs cooperation, in particular for the timely transmission of information for the purposes of cross-border surveillance and hot pursuit.

2. In addition to these short-term measures, they will in particular consider the following options:

(a) exchanging equipment or posting liaison offers provided with appropriate radio equipment;
(b) widening the frequency bands used in border areas;
(c) establishing common links for police and customs services operating in these same areas;
(d) coordinating their programmes for the procurement of communications equipment, with a view to installing standardised and compatible communications systems.

Disaster Relief (DR) radio communications are used by agencies and organisations dealing with a serious disruption of the functioning of society, posing a significant widespread threat to human life, health, property or the environment, whether caused by

[18] The European Geostationary Navigation Overlay Service (EGNOS) is a satellite based augmentation system (SBAS) under development by the European Space Agency, the European Commission and EUROCONTROL. It is intended to supplement the GPS, GLONASS and Galileo (when it becomes operational) systems by reporting on the reliability and accuracy of the signals.

accident, nature or human activity, and whether developing suddenly or as a result of complex, long-term processes.

Major disasters (natural, man-made, or a mix of both), such as the 2004 Tsunami in the Indian Ocean, the 2006 war in Lebanon, marine pollution episodes in third countries or more recently the forest fires and floods in Europe in the summer of 2007 have led to increased calls to improve the effectiveness of the existing EU disaster response capacity. In addition, the number of disasters related to climate change is increasing in frequency.

On 5 March 2008, the Commission published its Communication[19] on "Reinforcing the Union's Disaster Response Capacity". The chapter on "Capacity building across Community policies and instruments" states that the enhancement of broadband and mobile communications for public protection and disaster relief services, as well as the opportunity to enable EU-wide interoperability, should be examined. In order to strengthen the capacity across the community, the Commission will consider reserving bandwidth for emergency communications.

4. Administrative Structures

Institutional arrangements can have an important role in determining the efficiency and effectiveness of administrative processes. There is no single organisational approach to spectrum management within the European Union. In some countries such as Finland and Sweden, the National Regulatory Authority (NRA) manages all spectrum-related issues. The organisation responsible for spectrum matters can also be a Government Department (usually the Ministry of Communications/Telecommunications) as in Cyprus and Spain. In other countries, spectrum management is shared between different organisations including the NRA, government departments and in some cases other administrative bodies. In some cases, the manager of public spectrum is the public user. In France, a single entity (ANFR) manages the spectrum assignment process and separate entities (affectataires) manage the spectrum assignments.

Where spectrum management is fragmented between different bodies, there is often but not always a committee that coordinates public sector use and requirements. Such committees, however, appear to have tended to focus on technical issues, and to dealing reactively with competing public sector spectrum demands. In order for an integrated strategy to management of the entire spectrum to be effective, the body responsible for non-public sector spectrum management should participate in such a committee.

Whether the committee structure is the best approach, as compared to either the NRA or a Government Department having full responsibility for spectrum management is unclear. Having a single spectrum manager (body or committee) making final decisions about spectrum strategy would seem likely to have advantages in terms of achieving a consistent and integrated approach. The absence of any body or committee to coordinate all (public and non-public) spectrum requirements would however seem likely to be a major deficiency, as there needs to be a forum in which sharing between spectrum users is facilitated and conflicts in requirements are resolved.

5. Economic and Societal Considerations

[19] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0130:FIN:EN:PDF

In spectrum management, it is becoming increasingly important to estimate the social and economic value of different usages of spectrum. At certain frequencies, demand for spectrum is exceeding availability, especially at frequencies suitable for mobile communications and wireless broadband. Obtaining greater operational performance and economic/societal value per unit of spectrum would improve public service delivery as well as have a positive impact on the achievement of the core goals of the European Union Lisbon Strategy for growth and jobs.

Nevertheless, it might not be as straightforward as simply weighing up the quantified costs and benefits when considering alternative usages. This is because the benefits from public use of spectrum can be difficult to quantify as they normally relate to the society as a whole. Such benefits may also be difficult to foresee and may be realised over a very long period of time.

In order to optimise spectrum use, a number of countries have conducted significant national policy reviews in recent years concerning public sector spectrum management and use: Australia (2008), the Netherlands (2005), Sweden (2007), the UK (2005), the USA (2008). In all cases, the purpose of the review was to identify ways of improving the efficiency (that is, not assigning more frequencies than is necessary) and effectiveness (that is, having sufficient frequencies to achieve the intended objectives) of public sector spectrum use. As the reviews are very recent, implementation of the recommendations has only just started in the Netherlands and the UK. In the Netherlands the approach is based on administrative mechanisms, while in the UK the approach is based on market mechanisms. Examples of market mechanisms are presented in Annex 2.

In the administrative approach, public sector spectrum users prepare a spectrum needs justification plan, in which they state the legal framework (legal basis for the public task and whether the task is based on an international treaty or not), their operational and technical requirements as well as their future needs and also whether their task could be performed using alternative means other than spectrum. The needs justification plan is then evaluated by the spectrum management authority in terms of effective and efficient frequency use.

In the market mechanisms approach, public sector spectrum users pay fees for the continued use of their existing assignments. Those fees are set on a basis which is intended to reflect the value of comparable non-public sector spectrum; the value can be determined by a variety of methods, including analysis of auction results. Public sector users meet their needs for new spectrum from the market and they also have the right to release spectrum to the market (subject to any international and/or cross-border agreements). Spectrum trading gives public sector bodies the flexibility to decide which spectrum to release or share and on what terms and also the flexibility to enter into leasing arrangements for a limited time if they do not wish to dispose of the spectrum permanently. Before making such decisions, they usually audit their current spectrum use and their future requirements.

Charging for spectrum use and enabling trading, could result in improved spectrum efficiency. Spectrum pricing could give an incentive to public services to facilitate decisions on what is economically the “right amount of spectrum” in the knowledge that their decision will have an impact on the budget available for other resources which they

need. Also, allowing public sector bodies to retain the proceeds from spectrum trading, as an addition to their budget, could be an effective incentive to release spectrum to the market. Furthermore, paying fees might create incentives for public sector bodies to consider acquiring spectrum efficient equipment.

The two paradigms, namely the administrative approach and the application of market mechanisms are not necessarily mutually exclusive. Certain frequency bands which are not harmonised to be used exclusively by the public sector are candidates for applying market mechanisms, while there are cases where certain public sector organisations do not have the means to acquire spectrum through the market and therefore spectrum should be made available to them through administrative mechanisms.

In most cases, the first task in national review processes has been to undertake an audit of the use of public sector bands. The audit provides the information base for any assessment of efficiency of use, and helps the public sector user to identify opportunities for sharing or otherwise releasing spectrum. Next, specific bands where spectrum might be released or shared are identified, but often this requires additional studies to be undertaken to ensure that any changes do not result in harmful interference or otherwise reduce safety or security requirements. In all cases, opportunities for spectrum release or additional sharing have been found.

In the UK, there has been considerable activity over the last two to three years following the publication of the Independent Audit of Public Sector Spectrum Holdings. This has led to the publication of statements concerning future public sector spectrum requirements. The UK's Ministry of Defence has said that release of spectrum will begin early in 2009 with an investment appraisal for the release of spectrum within the band 406.1-430 MHz. Work on the 3400-3600 MHz, 4400-4500 MHz, 4500-5000 MHz and 5300-5850 MHz bands will follow. The Ministry of Defence has said that it aims to release some spectrum from within these bands by November 2010.

In the USA considerable emphasis is placed in the future use of IT to automate frequency co-ordination and increased sharing between public sector users and between public sector and non-public users. The USA also sees more dynamic spectrum technologies as providing a way of sharing public sector spectrum assignments.

Australia has allowed trading of public sector spectrum for some time, but there has been relatively little activity. It is thought that this is partly because public sector organisations are less likely to respond to a theoretical opportunity cost (the value were the spectrum traded) than an actual cost. It is for this reason that the UK regulator has applied AIP[20] to incentivise more efficient spectrum use by public sector organisations and also why this policy is being considered in Australia, Sweden and the USA.

All countries studied have considered whether public sector users should face similar financial incentives to those that operate in the non-public sector, as a spur to more efficient spectrum use. This requires a clear definition of the access rights of public sector users which in some countries is lacking at the moment. Greater transparency in the rights of public sector users has further general advantages in enabling the coordination required to share and/or use neighbouring bands more intensively.

[20] Administered Incentive Pricing

6 Opinion of the RSPG: Best practices

Preamble

The RSPG notes that demand for spectrum below 15 GHz is expected to grow in both public and non-public sectors and spectrum shortages are likely to limit innovation and growth unless the spectrum is effectively managed.

The public sector as a whole holds at the present time significant amounts of spectrum. Spectrum should be used by public bodies as efficiently as possible to provide essential services, so as to ensure that any spare capacity can be used either by other public sector bodies to deliver other important services or to provide opportunities for the non-public sector to access spectrum in order to foster competition and innovation and to promote consumer welfare. It should however be noted that in the frequency range below 6 GHz, a significant amount of spectrum has already been transferred from the public sector, mainly from defence, to the non-public sector especially for mobile applications.

It is recognised that, as in the non-public sector, the spectrum requirements of certain public sector bodies may also increase in the future, as these sectors, following technological developments or increasing demand, may need to introduce new communications services or enhance existing services. These new demands will need to be subject to critical objective assessments.

General aspects

In helping Members States to optimise the use of spectrum for the public sector as well as more efficient spectrum management regimes, the RSPG has identified the following best practices:

6.1 No spectrum should be seen as special with a predetermined use for the future. As far as possible, spectrum use should be on a technology and service neutral basis. However, it should be recognised that there are special needs for some public uses and these needs should, after assessment, be acknowledged and prioritised.

6.2 The RSPG recognises that spectrum use by the public sector to deliver specific public safety and security services is of paramount importance, where it facilitates the fulfilment of essential general interest objectives and the implementation of key national and EU policies. There should not, however, be a presumption that public sector use of spectrum is more important than non-public sector use. This should be taken into account when developing impact assessments which could lead to well informed decisions on spectrum assignments.

6.3 Sharing spectrum between public bodies and between public and non-public bodies should be considered before spectrum is assigned. The RSPG has identified three sharing possibilities, namely frequency band sharing, time sharing and geographical sharing.

Frequency Band Sharing

This sharing possibility can be introduced in cases where unacceptable interference is not caused between the different users of a band in the same radio coverage area and it could be further explored by supporting the technical work of the CEPT and cooperating with ETSI[21]. Also, the promotion of research activities at EU level, to identify opportunities for further sharing possibilities, should be encouraged.

Time Sharing

For the three public sectors under consideration, certain spectrum could be identified that need not be used all the time, only occasionally. For example, there may be a need to use part of the spectrum assigned to defence only in crisis situations and when the military is conducting exercises or the spectrum assigned to emergency and public safety services in order to deal with an emergency situation. Whilst it is important to ensure that access to spectrum is guaranteed the moment it is needed under such situations, the possibility exists to use the spectrum for other applications when it is not needed by the primary user, when it is idle. Spectrum could be shared on a short or long term basis under the condition that the use is vacated on short notice as soon as there is a need from the public user. Clearly, in these situations, appropriate conditions should be included in licences and networks should be designed accordingly. The possibility of time sharing of spectrum either on a long term basis or for temporary use by other applications when it is not needed by the primary user should be further explored. There are however cases where time sharing of spectrum use may not be possible because there is a need for continuous use or availability of the spectrum (e.g. some spectrum used by civil aviation authorities).

Geographical Sharing

There are situations where public use of spectrum is needed only in certain geographical areas. For example, some of the spectrum assigned to the maritime sector may need to be used for maritime radio services only near the coastline, inland waterways and rivers. Therefore, such spectrum could be made available for other applications in other geographical areas.

6.4 Overall, sharing could be facilitated by a number of factors, including the following:

(i) The establishment of effective institutional arrangements for promoting sharing possibilities. The implementation of a dynamic spectrum sharing approach by sectors, whereby different sectors conclude agreements between them in order to specify the sharing conditions, could be such an effective institutional arrangement.
(ii) Precise definition of the parameters of use (technical including protection criteria, time, geographical) of the spectrum by public sector bodies is important. Regarding the defence sector the availability of information, due to its sensitive nature, may be restricted.
(iii) The public sector body that is using a particular frequency band should be actively involved in defining the sharing conditions of that band. Where a

[21] European Telecommunications Standards Institute

public sector body may need to reclaim spectrum that is shared with other party(ies) (public or non-public), there should be sufficient guarantees that the other party(ies) will stop using the spectrum as agreed.

(iv) The establishment of speedy mechanisms for resolving sharing problems (e.g. interference) and in general disputes between sharing parties.

(v) Cognitive radio (CR) is a useful concept, which when implemented could achieve more efficient use of spectrum and should be exploited further. However, there is a need for more research in this area. To reap the full benefits of CR technologies, Europe has to undertake a coordinated approach where researchers, manufacturers, standards organisations, public organisations and regulators come together to develop new and enhance existing CR systems (i.e. more research and development), develop standards and define the national regulatory environment for the operation of these systems.

(vi) The granting of different categories of user rights, such as priority and pre-emption rights to guarantee access to predetermined users and possibly bar others from using the spectrum when this is considered necessary. Specific attention should be paid to these technologies which could result in more frequency band sharing and time sharing possibilities. It is worth noting two examples of priority and pre-emption cases:

   (a) In a priority based TETRA facility, user terminals were awarded one of ten levels of priority classification. During an emergency situation where congestion is experienced, these levels of priority can be used to determine who has access to the network.

   (b) GSM networks are able to use pre-emption to prevent access in given cell areas to all but pre determined emergency users (other general users will find call attempts are barred). Emergency services phones had to be properly registered as priority devices in order to work and the general population had the impression that the networks were overloaded, as they were unable to use their mobile phones.

6.5 The RSPG recognises that migrating to digital technology or generally to new or improved technologies, whenever it is possible, can help to free up spectrum and/or deliver better service. One sector which has made good progress towards adoption of digital standards is emergency and public safety, where most EU countries have at least partly migrated their emergency service communications to digital trunked mobile networks operating in the harmonised 380 – 400 MHz band. Another good example is the effort for reducing radar out of band emissions, using technological improvements, which could lead to the release of spectrum for other users.

International level

6.6 Whilst national administrations are responsible for assignment and use of spectrum, the international context is highly important and many public services are linked to international agreements. This means that measures to improve spectrum efficiency, with regard to public sector use of spectrum, will sometimes need to be pursued in the relevant international bodies. The ITU is the main global body for spectrum allocation and harmonisation. Sectoral international bodies, such as IMO, ICAO, Eurocontrol and NATO, also play a role. A concerted line by the

EU Member States will help achieve the desired objectives in these international bodies.

6.7 The RSPG notes that at national level, plans for future public sector spectrum use are being developed in some countries and are being integrated into planning for non-public sector use. However, this practice is not yet widespread. Moreover, the coordination and planning process of future use of spectrum which is done at CEPT level, with political guidance from the European Commission, when preparing for WRC conferences, is working quite well and provides already a part of the planning for the public sector.

National level

6.8 There is no single organisational approach to spectrum management by European Union Member States. In some EU Member States there is a single organisation responsible for spectrum management, but in other EU Member States there are several authorities that are involved in the management of the frequency spectrum. In Member States where there is a multiplicity of "frequency managers", a committee that coordinates public sector use and requirements can help in improving cooperation between all entities involved in spectrum regulation (and spectrum use) and can help in increasing spectrum efficiency. The different frequency managers should cooperate between them in matters of spectrum sharing, where they can agree on a bilateral basis between them on sharing rules. This kind of bilateral agreements between frequency managers can be a means favouring the development of sharing spectrum between categories of users. In conclusion, a single spectrum manager (body or committee) making final decisions about spectrum strategy would seem likely to have advantages in terms of achieving a consistent and integrated approach in which sharing between spectrum users is facilitated and conflicts in requirements are resolved.

6.9 In order to determine their needs for spectrum to provide public services, public bodies should undertake an *ex-ante* detailed audit of their current and future needs so they can decide whether they need more spectrum to meet demand or whether they may release or share spectrum without compromising their public service objectives. This assessment should be revisited regularly (*ex-post* review) in the light of changes in public service requirements, technologies, sharing possibilities/methods and the value of alternative uses of the spectrum.

6.10 Unlike the non-public sector, the extent to which assignments to public sector users are formally licensed varies considerably from country to country. The RSPG notes that at national level fully documenting the rights of use by public sector bodies can be considered as a best practice. Furthermore, the more information the Member States have, regarding current spectrum use and expected future use by public sector bodies, the better it is with respect to the efficient management of the spectrum, including facilitating band sharing and spectrum release, always taking into account that the release of information on public sector spectrum use will in some cases need to be limited on security grounds, particularly as regards detailed assignment information.

6.11 Where a public sector body needs a service that is available through the market, due consideration should be given to acquiring it from the market, if that is the most efficient way to proceed.

6.12 One way of ensuring that the public sector has the "right amount of spectrum" is to apply the "justification procedure". Under this arrangement, each public sector body must submit a detailed explanation of its spectrum requirements, so that the responsible national authority can determine whether these are reasonable. However, the spectrum requirement of a public sector body may change, for example due to the introduction of new systems or because old systems have become obsolete. Therefore, each public sector body should restate its spectrum requirement every (for example) 3 years with the possibility of interim updates. Under this approach, the responsible national authority must have the necessary technical and operational understanding in order to make a meaningful assessment, and must be provided with sufficient detailed information about current usage and the new requirement.

6.13 Another approach to ensure that the "right amount of spectrum" is assigned to public sector users is one which relies on spectrum pricing. Spectrum pricing could give an incentive to public sector bodies to consider what is economically the "right amount of spectrum" in the knowledge that their decision will have an impact on the budget available for other resources which they need.

6.14 Spectrum trading gives public bodies the flexibility to enter into leasing arrangements for a limited time if they do not wish to dispose of the spectrum permanently and so creates additional opportunities for spectrum to be made available for innovative services. This can be especially useful for the public sector because of their long time horizons for planning. It should be understood however that trading mechanisms are not necessarily applicable in all frequency bands used by the public sector, as they may not be compatible with the operational constraints of public services arising from the need for harmonisation either at global level (for example in the civil aviation and maritime sectors) or in a large number of countries which are signatories to multilateral treaties (such as NATO and Schengen). An important practical issue is to ensure that public sector bodies have effective and appropriate incentives to release spectrum to the market. This can be achieved by allowing them to retain the proceeds from spectrum trading as an addition to their budget. Otherwise, the incentive effect is likely to be weaker and spectrum release less likely. Allowing public sector bodies to engage directly with the market and to dispose of surplus spectrum by trading reinforces the incentive effect.

6.15 Spectrum pricing and trading should be applied gradually and on a case by case basis, taking into account harmonisation issues, interference issues and macro-economic aspects. However, frequency bands which are not harmonised to be used exclusively by the public sector are candidates for applying market mechanisms. Furthermore, there may be a need for legislative changes to enable market mechanisms to be applied in the public sector (e.g. the regime governing the trading of spectrum by public sector bodies).

6.16 The RSPG notes that equipment procurement decisions made by public sector bodies rarely include consideration of the opportunity cost of spectrum used.

Paying fees might create incentives for public sector bodies to consider acquiring spectrum efficient equipment.

6.17 Harmonisation of allocations and of assignment mechanisms among the Member States could potentially generate greater interoperability or enhanced economies of scale. When European harmonisation measures are adopted (e.g. through EC Decisions) that require an incumbent spectrum user, whether in the non-public or the public sector, to be moved from a frequency band, if sharing is not possible between the designated and the incumbent body's uses, consideration must be given to relocating the affected organisation in another frequency band and possibly compensating it financially. Before a European harmonisation measure is adopted, all possible ways should be studied to minimise the burden on both non-public and public sector organisations and an impact assessment should be conducted.

6.18 The RSPG recognises that refarming spectrum from public sector to non-public sector use may impose costs on the public sector user where equipment needs to be replaced or moved. However, where equipment can be re-tuned or where vacant spectrum is released, costs may be low or nonexistent. The public sector user is likely to be reluctant to incur these costs because they typically have not been considered in the budgeting process. There are a number of ways to facilitate this process:

(a) setting up a refarming fund financed by spectrum fees paid by new users;
(b) using revenues from the auction of spectrum that is to be vacated to fund the migration;
(c) requiring new users in the band to negotiate with the incumbents; or
(d) offsetting costs by a reduction in spectrum fees, where applicable.

6.19 The RSPG recognises that any processes of coordination between public sector users and between non-public sector and public sector users appear to be undertaken at a manual level if at all. Automation of these interactions is partly held back by the absence of complete and accurate assignment databases. Where sufficiently reliable and comprehensive databases exist, it is possible that requests for assignment information and assignment processes could be automated. An example of a coordination mechanism within a sector is the SAFIRE[22] system for VHF aeronautical communications. SAFIRE is being progressively enhanced to support all aeronautical spectrum related processes. Automated spectrum tools used, when possible, can increase efficiency and transparency. However, the application of coordination mechanisms such as SAFIRE needs to be further studied, as its application between different sectors has not been demonstrated yet.

[22] Spectrum And Frequency Information ResourcE

Annex 1

Overview of International/Intergovernmental Organisations

The following paragraphs summarise some of the international/intergovernmental organisations which influence the way these bodies use spectrum to deliver services.

1. Defence

There are two major international organisations which influence the way defence sector bodies use spectrum to deliver services, the European Defence Agency (EDA) and the North Atlantic Treaty Organisation (NATO) which, in some cases, is in charge of spectrum management.

European Defence Agency

The European Defence Agency (EDA) was established under a Joint Action of the Council of Ministers on 12 July 2004, "to support the Member States and the Council in their effort to improve European defence capabilities in the field of crisis management and to sustain the European Security and Defence Policy as it stands now and develops in the future". The EDA is ascribed four functions: developing defence capabilities, promoting defence research and technology, promoting armaments co-operation and creating a competitive European defence equipment market and strengthening the European defence, technological and industrial base.

The EDA Project Team on Radio Spectrum (PT RS) supports the European Member States policies by providing, to the extent possible, coordinated European military radio spectrum views and requirements in order to obtain a consolidated approach to spectrum access in the EU, facilitating harmonisation for military uses.

North Atlantic Treaty Organisation

The North Atlantic Treaty Organisation (NATO) is an alliance of 26 countries from North America and Europe committed to fulfilling the goals of the North Atlantic Treaty signed on 4 April 1949. In accordance with the Treaty, the fundamental role of NATO is to safeguard the freedom and security of its member countries by political and military means.

In addition to the 26 NATO member countries a further 24 Partner countries participate in the Euro-Atlantic Partnership Council (EAPC). The EAPC provides the overall political framework for NATO's cooperation with Partner countries and the bilateral relationships developed between NATO and individual Partner countries with the Partnership for Peace programme. Consultation and cooperation in the EAPC takes place in a wide range of areas including, but not limited to, crisis-management and peace-support operations; regional issues; international terrorism; defence issues such as planning, budgeting, policy and strategy; civil emergency planning and disaster-preparedness; armaments cooperation; nuclear safety; civil-military coordination of air traffic management; and scientific cooperation.

Frequency management is an indispensable function to ensure interoperability among NATO forces in the area of NATO operations and to prevent harmful interference to non-military users of the spectrum. The senior NATO body dealing with frequency management is the NATO CIV/MIL Frequency Management Sub-Committee (FMSC), composed of permanent national representatives, both civil and military.

The NATO CIV/MIL FMSC contributes to the Alliance defence capabilities with respect to the provision of sufficient radio spectrum resources to ensure that NATO military forces have adequate access to the spectrum to accomplish their mission and to harmonise the military use of radio frequencies amongst NATO Allies.

The frequencies needed for military purposes required by NATO forces or in support of NATO are agreed in the NATO Joint Frequency Agreement (NJFA). The NJFA is an agreement between the civil and military authorities.

2. Emergency and Public Safety Service

With the support of the European Commission, the "Forum for Public Safety Communication Europe" has been established in order to facilitate consensus building in the area of public safety communication and information management systems. Its mission is to foster, by consensus building, excellence in the development and use of public safety communications and information management systems to improve the provision of public safety services and the safety of the citizens of Europe and the rest of the world.

3. Public Transport

3.1 Land Transport

The EU body dealing with spectrum issues in the railway transport sector is the European Railway Agency.

European Railway Agency

The European Railway Agency (ERA) was set up to help create an EU-wide integrated railway area by reinforcing safety and interoperability. Besides representatives from the European Commission, each EU Member State is represented with full voting rights in the body supervising the Agency. The main task of ERA is to develop economically viable common technical standards and approaches to safety, working closely with railway sector stakeholders, national authorities and other concerned parties, as well as with the European institutions.

ERA acts as the system authority for the European Rail Traffic Management System (ERTMS) project, which has been set up to create unique signalling standards throughout Europe. One component of ERTMS is GSM-R.

3.2 Aeronautical Transport

Major organisations dealing with spectrum issues in the aeronautical transport sector are the International Civil Aviation Organisation, Eurocontrol and the European Aviation Safety Agency.

International Civil Aviation Organisation

The International Civil Aviation Organisation (ICAO), a UN Specialised Agency, is the global forum for civil aviation. ICAO works to achieve its vision of safe, secure and sustainable development of civil aviation through cooperation amongst its member States. The ICAO European and North Atlantic Office is accredited to 54 Contracting States of ICAO and serves two Planning and Implementation Regional Groups, the North Atlantic Systems Planning Group (NATSPG) and the European Air Navigation Planning Group (EANPG).

The frequency spectrum management related activities within ICAO exist at 2 levels:

- The worldwide level through the work of the ICAO Air Navigation Commission (ANC) with the assistance of the ICAO Aeronautical Communications Panel (ACP) and Navigation Systems Panel (NSP) to prepare the coordinated ICAO policies, spectrum estimates and technical inputs to ITU conferences and study groups.
- The regional level through coordination of frequency management aspects and assignment plans with States using agreed ICAO planning criteria by the regional offices.

In the European Region, civil aviation frequency matters are handled by the Frequency Management Group (FMG) of the ICAO European Air Navigation Planning Group (EANPG). The area of the EANPG responsibility covers 54 States in the ICAO European Region (www.paris.icao.int). The main tasks of the FMG are to:

(a) establish co-ordinated frequency assignment plans for the European aeronautical mobile services and the European radio navigation aids service, and to make recommendations, as necessary, concerning frequency aspects of their implementation;
(b) coordinate the frequency aspects of new requirements, as necessary;
(c) give advice to States on questions of frequency assignment, coverage, etc., as necessary;
(d) undertake specific tasks assigned to it by the EANPG;
(e) advise the EANPG on frequency spectrum issues covering all aeronautical radio services, including satellite based; and
(f) work in liaison with other international organisations.

Each State within the region (and also Eurocontrol, International Air Transport Association (IATA), International Council of Aircraft Owner and Pilot Associations (IAOPA) and recently NATO have a nominated FMG Member, being authorised for aeronautical frequency management. In order to take care of possible problems in the border area between Regions, the FMG also includes experts from States adjacent to the European Region, in practice the States along the Mediterranean.

Eurocontrol

Eurocontrol is the European Organisation for the Safety of Air Navigation and it was created in 1963 by six founding members. This civil and military intergovernmental

organisation now counts 38 Member States from across Europe. It is based in Belgium with specialised offices in six other European countries.

The objective of Eurocontrol is the development of a uniform pan-European Air Traffic Management (ATM) system, perfectly embodied in the concept of a Single European Sky. By reaping the benefits of a fully integrated air traffic management system Eurocontrol also contributes to making European aviation safer, more secure and more environmentally friendly. Eurocontrol plays a unique role at the European level in coordinating efforts from all aviation stakeholders to achieve common goals.

On behalf of its Member States and in close co-operation with ICAO, Eurocontrol developed the SAFIRE[23] co-ordination tool for spectrum and frequency management.

European Aviation Safety Agency

The European Aviation Safety Agency[24] (EASA) is an agency of the European Union which has been given specific regulatory and executive tasks in the field of aviation safety. The Agency constitutes a key part of the European Union's strategy to establish and maintain a high uniform level of civil aviation safety in Europe. The European Aviation Safety Agency was established by Council Regulation (EC) No 1592/2002 of the European Parliament and of the Council of 15 July 2002 (OJ L 240, 7.9.2002 repealed by Regulation (EC) No 216/2008)).

EASA promotes the highest common standards of safety and environmental protection in civil aviation in Europe and worldwide. It is the crucial part of a new regulatory system which provides for a single European market in the aviation industry. The agency's responsibilities include:

- expert advice to the EU for drafting new legislation;
- implementing and monitoring safety rules, including inspections in the Member States;
- type-certification of aircraft and components, as well as the approval of organisations involved in the design, manufacture and maintenance of aeronautical products;
- authorisation of third-country (non EU) operators;
- safety analysis and research.

It is foreseen that EASA will also be responsible for safety regulations regarding airports and air traffic management systems.

3.3 Maritime Transport

The major organisation dealing with spectrum issues in the maritime sector is the International Maritime Organisation.

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[23] Spectrum And Frequency Information ResourcE

[24] http://www.easa.eu.int

International Maritime Organisation

The International Maritime Organisation (IMO) is a specialised agency of the United Nations which, with the ITU, is responsible for regulating maritime use of spectrum. Frequency bands are allocated for maritime use at an international level by the ITU. IMO specifies the carriage of specific spectrum-dependent equipment for certain classes of ships through the international Conventions which it develops.

A key example of these is the International Convention for the Safety of Life at Sea (SOLAS). The Convention requirements become binding on Member States either individually when it is ratified or collectively when a sufficient number have ratified it, thus making the requirements mandatory for the remainder. It is a requirement that Member States put in place their own legal arrangements which will ensure that Convention requirements are enforceable on ships flying their flag or on ships registered in other Member States but which operate within their territorial waters.

Detailed carriage requirements for both radiocommunication and navigation equipment are specified in SOLAS and are dependent on the sea area in which the ship engages on voyages, and other ship specific details e.g. length and Gross Tonnage. Four sea areas are defined in SOLAS requiring communication coverage in the VHF/MF/HF bands and also satellite coverage particularly for polar areas. The SOLAS Convention also requires passenger vessels and all other commercial vessels over 300 gross tonnage to carry a 9 GHz radar, whilst vessels over 3000 gross tonnage must also carry a 3 GHz radar, or where considered appropriate by the administration, a second 9 GHz radar. SOLAS also requires all passenger ships and all other vessels over 300 gross tonnage on international voyages to fit equipment necessary to comply with the Global Maritime Distress and Safety System (GMDSS) in accordance with the SOLAS Convention. GMDSS includes the following capabilities:

- Digital Selective Calling (DSC)
- Emergency Position Indicating Radio Beacons (EPIRBs)
- NAVTEX
- Search and rescue transponders (SARTs)
- Voice communications

SOLAS requirements continue to be revised as new technology becomes available, and were recently extended to requiring certain classes of vessels to carry Automatic Identification Systems (AIS) and from December 2008 Long Range Identification and Tracking (LRIT) equipment. The SOLAS requirements together with IMO Resolutions and Recommendations on performance standards, ITU Radio Regulations and ITU Recommendations, form the basis for the various mandatory testing standards (IEC and ENs) for ship-borne radiocommunications and navigation equipment.

Annex 2

Examples of Market Mechanisms

1. Administered Incentive Pricing

Administered Incentive Pricing (AIP) involves setting fees at a level that reflects the estimated marginal value of the spectrum. Economic theory predicts that this will secure optimal use of the spectrum resource.

AIP fees can be set on a variety of basis, typically by using an algorithm based on:

- a national rate per MHz, which may be higher for those (lower) frequencies in greatest demand, such as those most suited for mobile applications;
- bandwidth;
- proportion of the population within the coverage area;
- other modifiers as appropriate.

AIP fees should be no higher than necessary to achieve spectrum management objectives, such as spectrum efficiency and promoting innovation and competition. Intentional use of AIP to raise revenue for government will tend to distort the beneficial properties of AIP. AIP could provide incentives to use spectrum more efficiently. This can result in the return of spectrum to the appropriate authorities to make available for other users or uses.

2. Spectrum Trading

In bands where spectrum trading is allowed by NRAs, users have the flexibility to decide which spectrum to release or share and on what terms. Users themselves will have better information than the Regulator of the value of alternative uses of spectrum and can be expected to achieve a more optimal outcome although there still be a need for a regulatory framework, for example to ensure compliance with international obligations, prevent distortions of competition and control interference.

Public sector users will generally be in a better position than the National Regulators to judge how much spectrum they need to deliver essential services and to decide when and on what terms to release or share spectrum without compromising public service objectives. A public body returning spectrum to the Regulators gains from having to pay less AIP. However, if it trades the spectrum instead of returning it, it can realise additional gains if the value of the spectrum to the alternative user is greater than the AIP. This is quite likely in practice as AIP levels are reviewed only periodically and might well lag technology or market developments.