COMMISSION OF THE EUROPEAN COMMUNITIES

Brussels, 12.12.2006
COM(2006) 769 final/2

Corrigendum
Concerne les versions EN/FR/DE du COM(2006) 769 final du 8.12.2006
EN/FR p. 2 et DE p. 2-3 modifications des adresses internet.

GREEN PAPER

on Satellite Navigation Applications

GREEN PAPER

on Satellite Navigation Applications

(Text with EEA relevance)

1. INTRODUCTION

The European Union is building a global navigation satellite system (GNSS), comprising GALILEO and Egnos, which will provide a set of positioning, navigation and timing services.

The benefits of this technology have already been demonstrated with the availability of the US Global Positioning System (GPS). Applications are continuously being developed, covering all walks of life and sectors of the world economy. The market in products and services has been forecast to reach €400 billion by 2025.

The aim of this Green Paper, which addresses all stakeholders, is to launch a discussion on what the public sector can do to create an appropriate policy and legal framework for supporting the development of satellite navigation applications, beyond the financial support for research and the creation of infrastructure.

GALILEO is a flagship of the European Space Policy. Its objectives are, amongst others, to respond to citizen's needs, to serve other EU policies, to concentrate on space applications and to improve European competitiveness. Galileo is the perfect tool to achieve these goals.

GALILEO has also to be seen in the wider context of the Commission agenda for fostering innovation and in the Lisbon strategy in which the actions of the public sector can be crucial to foster the development of world competitive companies. It is a good example of a lead market.

A series of questions are posed in this document: the replies will be analysed by the European Commission, and used as a basis for recommendations to the Council and Parliament.

Further information on the GALILEO infrastructure and on the consultation process can be found at http://ec.europa.eu/dgs/energy_transport/galileo/green-paper/index_en.htm[1].

In parallel to this consultation, a contest for young people aged 15-25 will be launched for the most innovative ideas on the use of satellite navigation technologies and services. It will be rewarded with a prize. More details are also available at http://ec.europa.eu/dgs/energy_transport/galileo/green-paper/index_en.htm.

[1] Contributions can also be sent to "European Commission, Directorate-General Energy and Transport, Galileo Unit - Green Paper, B-1049, Brussels, Belgium".

2. SATELLITE NAVIGATION

2.1. Positioning, navigation and timing services

With a dedicated electronic device, a person can determine position and time accurately. As technology evolves, receiver miniaturisation will allow their integration into other devices such as mobile phones.

GALILEO is based on a constellation of 30 satellites which broadcast a set of very high quality signals. These are processed by receivers in order to determine their position. All other functions, such as pinpointing position on a digital map or transmission of position information for other purposes, are performed in the user device. The satellite navigation infrastructure itself is "passive" by design, i.e. it is unaware of the user's location.

2.2. Infrastructure

GALILEO will provide very accurate positioning and timing services worldwide for civil applications. Reliability will further allow the smooth development of receiver technologies and applications. Egnos, a European system that complements and improves GPS performance mainly over Europe, already provides services on an experimental basis.

The launch of the first GALILEO test satellite took place in 2005. The second test satellite is planned for 2007. The first four satellites of the operational constellation will be launched in 2008. A private consortium will then deploy the full constellation through a Public-Private Partnership contract. Availability of services will be provided as of 2011.

GALILEO has a strong international dimension. As other nations in the world are showing an interest, cooperation agreements have been established in order to promote and develop the use of GALILEO worldwide. Compatibility with the American GPS is also ensured, allowing combined use of the two systems.

A "European Radio Navigation Plan" is under preparation in order to coordinate the various navigation infrastructures in Europe.

2.3. Applications

All sectors of modern economies are affected by the development of satellite navigation technologies. The market for products and services is growing at an annual rate of 25%. Some 3 billion satellite navigation receivers should be in service by 2020. Satellite navigation is becoming more and more part of the daily life of European citizens, not only in their cars and portable telephones but also in energy distribution networks or banking systems.

Applications span a large range of sectors, not only in transport and communication but also in other markets such as land survey, agriculture, scientific research, tourism and others. Receivers are now found in all kinds of electronic devices for everyday use such as mobile phones, personal digital assistants, cameras, portable PCs or wristwatches. Mobile telephony is a promising market with over 2 billion mobile phone subscribers. Half a billion units are sold every year, with a prospect of 1 billion a year by 2020, allowing for fast market penetration of satellite positioning-based services.

Vehicles will increasingly be fitted with navigation equipment. Conservative projections suggest 50 million unit sales by 2020.

Transport management is on the verge of revolution: a few hundred thousand containers are already equipped with GNSS tracking and tracing devices. Thanks to such devices, logistics companies can offer faster and better services to their customers. Also, for security purposes container movements can be monitored.

For navigation in seas and waterways, satellite technology is a natural choice. This is confirmed both by current sale figures of maritime receivers (over €1 billion) and by the adoption of relevant legislation. The same applies to air navigation, where a reliable mean for increasing the system capacity for transporting millions of citizens is needed.

2.4. Technology evolution

New technologies like radio frequency identification devices, geographical information systems, receiver miniaturisation and power consumption reduction and the synergies with telecommunications will create the conditions for the emergence of a large set of new developments using satellite positioning in the coming years. Even "in-door" positioning solutions are being developed to overcome current limitations.

In parallel to the development of GALILEO, the European Union also launched GMES (Global Monitoring for Environment and Security), an Earth observation system for user oriented information systems. Many GNSS applications will benefit from the complementary technologies GALILEO and GMES. The evolution of user needs points towards the development of integrated telecommunications, meteorological, positioning and monitoring space systems in many areas of high strategic importance, economic value and societal benefits areas.

Such an evolution calls for a review by public authorities of the regulatory framework.

3. APPLICATION DOMAINS

GALILEO will provide five services that can be used in a variety of sectors. In this Green Paper, four of these are addressed:

– the open access service, addressing mainly the mass market,

– the commercial service, for professional users requiring outstanding performance and guarantees,

– the safety-of-life service, for applications where human life is at risk, hence requiring integrity information, and

– the search and rescue service to localise distress events and initiate rescue operations.

The fifth service, i.e. the "public regulated service", does not fall within the scope of this Green Paper. Consultation on the use of this service for security applications is taking place with governmental and Community entities directly.

3.1. Location-based services and emergency calls

Through the integration of satellite navigation receivers in mobile phones and other means of communication, location-based services and personal mobility constitute the largest mass

market for satellite navigation. The prospect of providing "tailor-made" data to users opens a new world for mobile telecom operators and service providers: customers can access specific "vicinity" information, such as the closest hospital, the most appropriate route to a filling station or the nearest restaurant.

Emergency services can also benefit: there are some 180 million emergency calls in the European Union every year, 60-70% of which emanate from mobile phones[2]. In more than a million cases, emergency vehicles cannot be dispatched due to the absence of sufficient location information. European initiatives are under way in partnership between the public and the private sectors to define the framework and technical solutions for implementing efficient emergency call management[3].

GALILEO can radically improve the accuracy of location-based services, and some civil protection authorities have already indicated that their use would ensure faster emergency services.

3.2. Road

GNSS applications in the road sector span a range of functions, from telematics and navigation devices to electronic fee collection (EFC) for highway or city tolls, as well as safety applications and pay-per-use insurance. Virtually all 240 million vehicles circulating in the EU could benefit from state-of-the-art navigation systems, and it is expected that many limitations of "intelligent transport system" initiatives can be overcome by GALILEO.

Road toll systems have developed rapidly in recent years. Some countries have already implemented kilometre-based charging systems relying on GNSS, specifically for heavy goods vehicles on inter-urban motorways. Urban congestion charging schemes are already in use. Directive 2004/52 requires all new EFC systems to use one or more of the following technologies: satellite navigation, cellular network telephony, dedicated short-range communication or a combination of these. Satellite navigation is recommended for its flexibility and its best fit with European charging policy, being infrastructure-free and easily expandable by nature. It allows varying pricing schemes, interoperability and intelligent transport system services. Traffic management, real-time traffic and travel information systems also improve transport efficiency[4].

The “eSafety” initiative, which includes a number of applications that could make use of accurate vehicle positioning, recognises the establishment of a pan-European in-vehicle emergency call standard[5,6] as a priority to reduce emergency intervention times by 40 to 50%, with the potential to save 2500 lives. Providing the direction of driving and making possible the identification of the side of the motorway on which an accident happened, information of prime importance for ambulances and rescue teams, is a clear supplementary benefit that GALILEO can provide.

---

2 Commission Communication, COM (2005) 431.

3 The processing of caller location information for the purpose of location-enhanced emergency services (E112) is covered by the Commission Recommendation C(2003)2657, Official Journal L 189 , 29/07/2003 P. 0049 - 0051

4 Action plan for Energy Efficiency: Realising the potential COM(2006)0545

5 Commission Recommendation 2003/558/EC.

6 Commission Communication COM (2005) 431.

Commercial pay-per-use insurance services are already available on the market. These services are based on satellite navigation coupled with mobile phone communication. Insurance companies offering such a service apply tariffs depending on calculated distances or provide financial incentives for limited use of a vehicle.

3.3. Rail

Railway infrastructures have always entailed the use of signalling and train location systems, mainly installed at track side. These require expensive equipment and extensive maintenance. In order to improve interoperability and reduce costs, those systems are being replaced by new standards: the European Rail Traffic Management System and the European Train Control System.

Feasibility of train control systems complying with rail safety standards using GNSS has been demonstrated. Satellite navigation has already been introduced in a variety of non-safety applications such as traffic control aid, railway resource management or customer support, but also for "positive train control" as demonstrated in the US. Safety enhancement for automatic train protection and control systems can be achieved through GALILEO.

3.4. Maritime, fisheries, inland waterways

The open sea and inland waterways are the most widely used mode for transporting goods worldwide. A wide variety of vessels move around the world each day. The efficiency, safety and optimisation of marine transportation are key issues to which GNSS can contribute. It is the International Maritime Organisation (IMO) that defines the requirements for position-fixing equipment for a worldwide radionavigation system[7], in terms of accuracy, integrity, continuity, availability and coverage for the various phases of navigation. For ocean and coastal navigation, the IMO defines navigation requirements and standards for onboard equipment.

Today, operational satellite navigation systems do not meet the requirements on their own, so augmentation systems[8] are still needed to improve GNSS performance, though these are not yet recognised. However, GALILEO can provide benefits for safety-of-life applications, for safety improvements or for "Automatic Identification Systems".

For port approaches, ports and restricted waters, the IMO[9] emphasises the use of GNSS. Existing and planned systems that provide a set of services to vessels at sea (as "Vessel Traffic Services" and "Automatic Identification System") also rely on the transmission of position-related information, which can clearly be provided by GNSS. Following EU Directive 2002/59/EC on the establishment of a vessel traffic monitoring and information service, which emphasises maritime safety and pollution preparedness, the European Union has undertaken to establish by 2008 a coastal vessel traffic monitoring system for the whole of the EU.

---

[7] Resolution A.953(23) on a worldwide radionavigation system and Resolution A.915(22) on maritime policy and requirements for a future global navigation satellite system.

[8] Such as WAAS and EGNOS (space-based systems designed to improve GPS positioning over the USA and over Europe, respectively) or the IALA differential-GPS infrastructure.

[9] Resolution A.915(22) maritime policy and requirements for a future global navigation satellite system.

GNSS is also considered a key tool for the "Global Maritime Distress and Safety System", set up by the IMO as an integrated communication system using satellites and terrestrial radio communication to ensure aid dispatching to any place where a ship could face a distress situation. In the near future, the "Long Range Identification and Tracking system", adopted in 2006, will further enhance maritime security: it will allow the tracking of ships beyond the coverage of coastal radio communications stations, with ship identity, location, date and time of position transmitted at regular intervals or on request. Furthermore, SafeSeaNet[10] allows rapid access by EU Member States to all important information relating to ships carrying dangerous goods. Certification must be addressed for many maritime applications, as it plays an important role for the common maritime space and the development of business cases.

The management of fisheries is based on legislation defining vessel access to areas, restrictions on gear types and fishing time, and quotas on the amounts of particular species which may be caught. Effective monitoring, control and surveillance regimes are put in place to ensure compliance with the legislation. Traditional control instruments have been complemented since the nineties by a satellite tracking technology known as "Vessel Monitoring System"[11], a system used by some 8000 fishing vessels. Knowledge of the exact position of vessels is a must.

Inland waterways represent only 6% of transport traffic compared with 76% for road: to give inland waterways a more prominent role, measures are being taken to modernise this sector. Directive 2005/44/EC on Harmonised River Information Services encourages the use of information and communication technology to increase the efficiency and safety of logistics operations and to improve environmental protection. The Directive also recommends the use of satellite positioning technologies and the establishment of vessel tracking and tracing specifications.

3.5. Aviation

In the aeronautical domain, GNSS services have long been an additional means of navigation. They already provide supplementary services for many flight phases, in leisure flying as well as in commercial air transport. It is the International Civil Aviation Organisation that defines the capabilities required for an aircraft to navigate in a particular airspace segment and allows the aircraft operator the choice of specific equipment to achieve these capabilities[12]. Analysts foresee strong growth through to 2025, with the need for more than 17 300 new passenger and freight aircraft due to a three-fold growth in passenger traffic and even faster growth in airfreight. The accuracy and integrity offered by GALILEO will enable greater use of existing airports currently not used in bad weather and visibility conditions.

In Europe, the "SESAR" Joint Undertaking, which implements the legal framework for air navigation service provision as defined by the four Single European Sky Regulations, will also rely on GNSS.

---

10 Directive 2002/59/EC.

11 Regulations (EC) Nos 1489/97 and 2244/2003.

12 ICAO Recommendations 6/1 and 6/2 of the 11th Air Navigation Conference.

3.6. Civil protection, emergency management and humanitarian aid

Helping people after earthquakes, floods, tsunamis and other natural or human-made disasters has long been a concern of public authorities. Locating assets, people and resources is of paramount importance for relief operations.

Civil protection comes under different organisational schemes in the various Member States, with some management autonomy at regional and municipal level. At European level, a Monitoring and Information Centre and a Crisis Platform have been established as a tool to enhance Community cooperation on natural disasters, emergencies due to marine pollution, chemical accidents and timely response to political crises.

Under the European Space Policy, European authorities are outlining a set of requirements governing space infrastructures for civilian crisis management operations, encompassing satellite navigation, earth observation, telecommunications and signals intelligence.

GNSS allows tracking of resources and workforces, improves the planning and optimisation of resource allocation and permits prompt responses in sparse and remote areas.

GNNS would also allow to monitor the movements of humanitarian actors and others on the ground and on the crisis scene, to strengthen the humanitarian needs and impact asessments, to provide accurate information on the problems of access to the affected populations in remote and areas that are difficult to access, to immediately track population movements, to identify safe areas for the set up of camps for refugees/internal displaced populations outside disaster prone areas, to optimise the allocation of financial, material and human resources, to increase the rapid response capacity, and to strengthen the overal humanitarian aid response.

3.7. Dangerous goods

A set of technical and administrative requirements have been defined for dangerous goods[13]. Due to their potentially destructive nature, they also have to be addressed in the new security context. The legal framework will need to be updated in order to take account of the many options that GALILEO could offer.

In the event of anomaly detection or exit from pre-defined routes, GNSS enables tracking and tracing, along with warning and alarms. Emergency action is also improved by the use of this technology.

3.8. Livestock transport

Every year, millions of animals are transported in the European Union. Traceability of livestock is of paramount importance to prevent sanitary fraud, to ensure food safety and to secure the welfare of live animals.

Council Regulation (EC) 1/2005 lays down the requirements for the transport of animals. Amongst a variety of measures, it imposes the use of GNSS in all new trucks for long

---

[13] European Agreement concerning the international carriage of Dangerous goods by Road (ADR), European Agreement concerning the international carriage of Dangerous goods on the Rhine river (ADNR), European Agreement concerning the international carriage of dangerous goods by Inland waterways (AND), the International Maritime Dangerous Goods (IMDG) code, etc.

journeys. This represents an important innovation that will facilitate the enforcement of other related policies in the area of animal and public health such as the implementation of cattle identification. It will take into account existing systems for tracking animals, such as the web-based "TRACES" which addresses consignments and imports.

GNSS, combined with communication, allows real-time tracking, thus reducing administrative burden for veterinarians and operators and enabling transporters to take corrective measures when necessary.

Harmonisation of technical specifications will allow faster implementation and in particular facilitate data collection at EU level.

3.9. Agriculture, parcel measurements, geodesy and cadastral survey

In the EU, 11 million farmers grow crops on 110 million hectares of land.

The location and size of parcels represent key information for use in commercial information exchange and with government authorities in applying for subsidies[14]. Parcel measurement by GNSS is yearly performed to verify the eligibility of subsidy claims. Information on about 50 million agricultural fields is already stored in the digital geographic information system of the integrated administration and control system of the European Union in 2005.

The control of payments under the common agriculture policy requires increasingly detailed and timely information. Furthermore, farmers make use of geo-information and GNSS for optimisation of crops, reduction of nutrients and pesticides and for ensuring optimal use of soil and water.

The use of GNSS can greatly simplify and improve geodesy data and cadastral survey measurements and help administrations to build appropriate map databases where information is either lacking or of poor quality.

3.10. Energy, oil and gas

The oil and gas industry makes extensive use of GNSS for onshore and offshore operations in both exploration and exploitation activities, where the accuracy and guarantees of positioning services are of the utmost importance. The safety and security of oil and gas transport also benefit from the positioning functions of GNSS.

In the electricity sector, power distribution networks use the accurate and precise timing functions of GNSS for their synchronisation.

3.11. Search and rescue

The search and rescue function of GALILEO is Europe's contribution to international cooperation in humanitarian search and rescue, mainly in the maritime and aviation domains. By allowing near real-time reception of distress messages from anywhere on earth with precise location information and contact from rescue centres to people in distress, it will facilitate operations and reduce the rate of false alerts, hence saving more human lives. This

[14] EC Regulation 796/2004, Article 30.

has also implications for the fight against irregular immigration by sea and the enforcement agencies' ability to rescue migrants in distress at sea.

3.12. Other applications: logistics, environment, science, law enforcement and others

GNSS also provides instruments for introducing improvements in the logistics domain. By enabling accurate and continuous tracking and tracing of boxes, containers or pallets, GNSS, coupled with other technologies such as Radio Frequency Identification Devices, is improving the management of supply chains and fleet management for all transport modes both in urban areas and for long distance journeys. Furthermore, in the context of multimodal applications, security can be reinforced by the use of electronic seals and other location-sensitive devices.

Satellite navigation technologies provide useful services in a wide range of sectors. Many of these could not be covered in this Green Paper, e.g. public transportation systems, public works and civil engineering, immigration and border control, police, monitoring of prisoners biomass production and feedstock management, environment management, medical applications and people with disabilities, scientific research, hunting, sports, tourism, waste disposal, and many others.

> ***QUESTION 1****: After indicating your area of interest in the above list (3.1 to 3.12), please give your opinion on:*
>
> – *what measures should be taken to accelerate the market introduction of your application,*
>
> – *the appropriateness of the legal and regulatory framework and the need to further develop it, the benefits of compulsory use of GNSS or equivalent positioning systems for your selected application, in accordance with the World Trade Organisation rules and commitments*
>
> – *the role of public authorities,*
>
> – *the protection of citizens (in terms of safety and security and other aspects of civil protection)*
>
> – *the benefits of GNSS,*
>
> – *the market perspective in your domain (in relation with the expected volume of use)*
>
> – *sensitivity to costs,*
>
> – *minimum accuracy requirements and other performance parameters,*
>
> – *the certification process,*
>
> – *integration with communication systems and*
>
> – *other issues you deem important.*

4. ETHICAL AND PRIVACY ISSUES

The capability of satellite navigation technology to locate and trace the position of people and goods has implications for privacy issues. The protection of personal data and privacy is a common and shared concern of citizens.

The right to privacy is a highly developed area of law in Europe. All Member States of the European Union are signatories to the European Convention on Human Rights, which guarantees respect for "private and family life, home and correspondence".

Most privacy issues related to satellite navigation are covered by the current legislative framework: Directive 95/46/EC regulates the processing and treatment of “personal data” in terms of "transparency, legitimate purpose and proportionality" and Directive 2002/58/EC addresses the processing of personal data and the protection of privacy in the electronic communications sector.

> ***QUESTION 2****: what is your perception of the existing legal framework governing privacy issues regarding the introduction of services based on GNSS? Do you see a need for any additional measures to address specific privacy issues?*

5. PUBLIC SECTOR ACTION

In parallel to the development of satellite navigation infrastructures, public sector authorities at national and EU level are sustaining the development of satellite navigation technologies. Public action has been taken in a number of areas including support for research, the adoption of an adequate regulatory framework and others. The potential range of public action is described below.

5.1. Research and innovation

As stressed in the Lisbon Strategy, research is recognised as a fundamental tool for triggering innovation and generating economic wealth. While the EU is still some way off its target of to invest 3% of GDP in research and development by 2010 - with the latest figures showing investment of 1.9% of GDP - there are nonetheless some encouraging signs of both businesses and governments increasing their research spending.

So far, total annual public and private spending in Europe on research into satellite navigation applications has been over €100 million. This figure is likely to increase fivefold when GALILEO becomes fully operational.

> ***QUESTION 3****: Is the overall research effort in Europe commensurate with the general objective of giving Europe state-of-the-art competence? In which relevant fields and sectors of research should efforts be concentrated? What needs to be done to increase the research effort and exploit research results at best?*

5.2. Small and medium-sized enterprises – excellence centres

SMEs are identified as key to achieving the objectives of the Lisbon strategy of making the EU the most competitive knowledge-based economy.

SME cooperation and networking at European level has been promoted within the EU's Sixth Framework Research Programme by allocating at least 8% of funding to this end. Studies have been performed on low power consumption receivers, indoor positioning methods, multi-frequency antenna designs, wildlife monitoring and other aspects.

Several regions in Europe have recognised the benefits of acquiring knowledge in satellite navigation. Pools of competence in positioning technologies have been developed by co-locating companies, research laboratories and institutes and by establishing partnerships with universities, faculties and schools. European Cohesion Policy in 2007-2013 will encourage regions to exchange best practice on developing Galileo applications through the initiative 'Regions for Economic Change'.

> ***QUESTION 4****: How should public authorities stimulate SMEs? Should competence centres, training programmes or any other instruments be supported (an in that case, which ones)?*

5.3. International cooperation

GALILEO offers an unrivalled international public service, as demonstrated by the number of countries willing to cooperate. Cooperation with non-EU countries, including developing countries, is essential to realise all the benefits of GALILEO, to promote industrial know-how, to stimulate EU and non-EU applications, to adopt global standards, to address worldwide markets and to promote GALILEO in international bodies. Cooperation schemes cover regulatory aspects, certification and frequencies as well as intellectual property rights, scientific research and industrial action.

GALILEO-GPS compatibility will ensure the availability of receivers with outstanding performance. This compatibility could apply to a third constellation once negotiations between Europe and Russia are concluded on a GLONASS evolution programme.

> ***QUESTION 5****: What is the most important cooperation issue to be implemented? Is there a particular sector of the world that needs to be targeted?*

5.4. Standards, certification and liability

In order to ease the future market penetration of GALILEO services, both the public and private sector have already been carrying out GALILEO-specific standardisation activities. Receiver performance standards have been established, and concrete actions have been launched in the aeronautical and maritime domains within the framework of the International Civil Aviation Organisation and the International Maritime Organisation. Work is ongoing within the rail and road communities to satisfy specific standardisation needs. Other location-based service providers are participating in the development of GALILEO standards.

> ***QUESTION 6****: do you believe that more effort should be devoted to the establishment of standards for satellite navigation devices and services, and at which level?*

For applications involving safety and liability aspects, equipment and service certification is a prerequisite. Assessments of positioning systems and application performances have to be implemented through "safety case" methodologies. Both system design and operational

procedures have to be certified to attest compliance with safety-critical application requirements.

The Egnos system will be certified in accordance with the Single European Sky Regulations. For GALILEO, the European GNSS Supervisory Authority will appoint a certification supporting body, which will consult the various regulators of safety-of-life uses, e.g. the European Aviation Safety Agency.

> ***QUESTION** 7: which safety applications do you believe require certification? Are the GALILEO infrastructure safety-related requirements sufficient to constitute the basis for system certification, including infrastructure lifetime? What are your liability concerns and how do you think they could best be addressed?*

5.5. Frequencies

The international spectrum allocations are done in full compliance with Regulations of the International Telecommunications Union and, in Europe, with the Radio Spectrum Decision[15] Safeguarding the frequency spectrum and promoting the allocation of new frequency bands is a key objective in order to ensure safe and guaranteed service performance for all users. Please note that these issues are also subject to a broader discussion in the context of the review of the EU regulatory framework for electronic communications[16]. Continuous performance improvement is dependent on frequency spectrum allocation.

> ***QUESTION 8**: Do you foresee the need for a better coordination of spectrum at the international and European level? Should measures be adopted regarding potential sources of interference?*

5.6. Intellectual Property Rights

The revenue potential of satellite navigation lies in the user segment, with the number of users likely to increase substantially. Patents may cover inventions relating to the methods used by GNSS receivers for capturing and demodulating the signals and for the related processing algorithms. They can also cover signal content and the chipsets to be built into GNSS receivers. The protection given by copyright may also be relevant in certain areas, particularly in signal processing and signal content.

> ***QUESTION 9**: Do you consider that the current IPR rules are adequate to ensure that innovators will be able to benefit from their activities while allowing users to enjoy these innovations?*

5.7. National laws and systems, EU directives and regulations

New technologies and innovation are key elements for modern societies. Legislators need to ensure that the benefits arising are adequately reflected within the community, that information is put to use and that innovation is fully exploited.

The use of satellite navigation has already been mandated at local, regional or national level. European legislation has been adopted in various sectors over the past years, on the basis that

---

[15] 676/2002/EC

[16] COM(2006) 334 of 29 June 2006.

GNSS facilitates and rationalises activities, enhances the level of services to citizens and reduces costs.

> ***QUESTION 10****: Are there any legal or regulatory barriers at national or EU level that need to be overcome for the market introduction of your application?*
>
> *Are national laws or EU directives or regulations required in your application domain? Give details of the relevant sectors and the benefits anticipated. What approach should be followed for the European Radio Navigation Plan?*

6. CONCLUSION

This Green Paper has set out the framework within which satellite navigation applications are developing and outlined questions for debate. It aims to prompt new ideas from industry, public authorities, consumer groups or consumers themselves in order to define concrete targets and the most appropriate public sector action with regard to GNSS.

The 7th Framework Research Programme will be used as a pillar to sustain public initiatives. The demonstration and full-scale implementation of service provision trials will bring about the necessary confidence for new businesses to develop.

In September 2007, the Commission will present an analysis of the results of the public debate, accompanied by an action plan containing the practical measures to be proposed as from 2008. In this analysis and in the measures that could be proposed based on this Green Paper, the Commission will take into account the principle of technology neutrality, safeguarding the competitiveness of all sectors of industry, and the interests and rights of the consumers