

*intelligent transport system (ITS)
Galileo, positioning systems*

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THE PERSPECTIVE OF ECONOMIC ASSETS BY APPROACH OF SATELLITES TECHNOLOGY

Satellite navigation technology is increasingly used in almost all sectors of activities. Its high-performance standards already make it an essential tool for very demanding professional, commercial and scientific applications. The paper examines how Global Navigation Satellite Systems (GNSS) technology has evolved over the past years and allowed for expansion into a wide range of sectors.

PERSPEKTYWA AKTYWÓW EKONOMICZNYCH W ŚWIELE TECHNOLOGII SATELITARNEJ

Technologia nawigacji satelitarnej stosowana jest coraz częściej w niemal wszystkich sektorach działalności. Jej wysokie standardy działania sprawiły, że stała się ona podstawowym narzędziem dla zastosowań profesjonalnych, handlowych i naukowych. Artykuł opisuje, jak technologia Global Navigation Satellite Systems (GNSS) rozwijała się w ciągu kilku ostatnich lat i ogarnęła szeroki zakres sektorów.

1. INTRODUCTION

The Commission adopted in 19 September 2001 its Indicative Multiannual Programme on the Community funding of Trans-European transport network projects over the 2001-2006 period. In line with the objectives set up in the new White Paper on transport policy, the selected projects will aim at removing bottlenecks on the Trans-European transport network and shifting the balance between the different modes of transport.

Galileo will get over 550 million EUR, i.e. about 20%, out of the total amount for 2001-2006 period – 2780 million EUR.

Galileo comprises a constellation of 30 satellites divided between three circular orbits at an altitude of around 24 000 km to cover the Earth's entity surface. And that will be supported by a worldwide network of ground stations.

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Galileo offers superior and constant accuracy thanks in particular to the structure of its satellite constellation and ground relay system. Guaranteed accuracy to 1 m is necessary for certain applications, such as entering a seaport or guiding a vehicle into a parking space.

EU project Galileo will play an important role in increasing of Effectively in various branches, including Transport.

2. THE EUROPEAN SATELLITE NAVIGATION SYSTEM

The Galileo project is entering its second phase in 2001: the development and validation phase, which will cost € 1,1 billion. 50 % of this amount, € 550 million, is proposed to be contributed from the TEN-T (Trans-European Network for Transport) budget. The measures covered by the proposed support include the detailed definition of the individual segments of the system, the development of the satellites, ground and local components and the "in-orbit" validation of the system, an early deployment of service capabilities.

This phase is vital for the final design and test of the final system to be contracted for in 2005 and launched between 2005 and 2007 during the deployment phase. It is also vital to establish an entity in charge of the management of the project which will pool all the funds of the project, and, more importantly, provide the single legal and management interlocutor necessary to allow private-sector financing of the deployment phase. A first core constellation of satellites will be launched from 2004. [1]

Galileo will provide the first satellite positioning and navigation system specifically for civil purposes. Its profitable applications will spread into many areas of all our lives – starting with safe and efficient transport. Using only small receivers, we will all be able to determine our locations to within a few metres.

Galileo is vital for the future of Europe's high-technology industries. It will generate new, large markets and provide the critical advance in technology for Europe to be a global competitor.

It is crucial for Europe and the whole world to have a choice independent of the current, older-technology US Global Positioning System (GPS) monopoly through a more efficient and reliable alternative. In addition, the scale of future navigation needs and the requirement for global coverage cannot be satisfied by a single system alone.

The Galileo programme has finally been launched. While the cost of deploying the system is some EUR 3.2-3.4 billion, the cost of rejecting it would have been immense: more than 100 000 new jobs and a market for equipment and services worth some € 10 billion per annum by 2010. [2]

Satellite navigation technology is increasingly used in almost all sectors of activities. Its high-performance standards already make it an essential tool for very demanding professional, commercial and scientific applications. It is now becoming part of a more general concept – that of "info mobility"- where users receive information tailored to their needs, and pertaining to their precise location.

Converging factors have favoured this remarkable expansion. The proliferation of communication networks and geographic information systems, together with the overall decrease of cost, size and power consumption of satellite navigation receivers have driven the market towards high-volume consumer applications. The public sector also plays a major role by constantly improving satellite navigation systems and setting up a regulatory framework,

which maximizes the use of satellite navigation services to increase safety and efficiency of all types of transport modes.

Ingenuity of manufacturers, service providers and research institutes has allowed for the development of new techniques that further increase system capabilities and open the door to even more applications. Differential satellite navigation techniques, based on code measurements, lead now to metric positioning accuracies, whilst phase measurement techniques reach centimetre or even millimetre accuracy. Technological progress (receiver miniaturisation and power consumption reduction), impact favourably upon satellite navigation receivers size and cost, with component prices falling at a rate of 25 - 30% per year. Handheld receivers are already being offered at less than € 50.

New developments are expected, based on mass consumer markets for both hand-held and in-vehicle devices, that will accelerate market growth in the following years. Professional and highly demanding applications are increasingly dependent on satellite navigation technologies. Civil aviation is moving towards satellite navigation as a primary means for navigation and the maritime sector is increasingly reliant on GNSS and Differential GNSS for open-ocean as well as harbour and in-land navigation. In the rail domain, these techniques will facilitate train signalling and traffic management, allowing for increase of line capacity and efficiency.

Road applications are also a huge GNSS market, with a wide range of applications ranging from "infotainment", through to road tolling and emergency applications. The number of cars sold every year, 14 millions in the EU in 2000, gives an idea of the potential size of this market.

Forecast for future global markets and applications for navigation show that this industry is at the beginning of a large expansion, with a global turnover of €15 billion in 2001, which is predicted to rise to €140 billion by 2015.

Initially characterised by a strong product-oriented dominance, it is expected that service provision will rapidly play an important role in the satellite navigation market. Ever since the launch of the first satellite navigation systems for military purposes (GPS in the United States and GLONASS in Russia), companies worldwide have been developing products and services to stimulate and serve a civilian market for positioning technology. From a baseline of professional equipment for surveying and civil engineering, continued innovation in technology has led to huge improvements in the price and performance of equipment. In tandem, entrepreneurs have continued to develop new applications and spawn new businesses to serve growing markets. Today, several thousand companies are already involved in satellite navigation device production and service provision, encompassing a large diversity of markets far outstripping anything that could have been envisaged even ten years ago.

As the market grows in size, it also develops in structure. Starting from an industry that supplied stand-alone navigation units, the situation has developed to combine both navigation and communication technologies.

Satellite navigation receivers are now commonly integrated into other devices, including in-car navigation systems, fleet management systems, and increasingly also into mobile phones and Personal Digital Assistants (PDAS). The product business is complemented by a rapidly developing service industry that integrates digital mapping, bundled with mobile communications to deliver packaged services to end-users.

Galileo applications will rely on integrated services: navigation data are combined with additional information layers. The numerous domains range from transport (air, rail, maritime, road, pedestrian) to timing, engineering, science, environment, search and rescue, and even recreation.

3. CONCLUSION

GALILEO is Europe's satellite radio navigation programme. It was launched on the initiative of the European Commission and will amount to the same kind of technological revolution as the one sparked off by mobile phones. It will also make for the development of a new generation of universal services in areas such as transport, agriculture or fisheries. To date, this technology, which promises to be highly profitable, is only mastered by the US GPS system and Russia's GLONASS system, both of which are financed and controlled by the military authorities.

The GALILEO programme will be administered and controlled by civilians and offers a guarantee of quality and continuity which is essential for many sensitive applications. Its complementarity with current systems will increase the reliability and availability of navigation and positioning services. A four-phase development procedure has been proposed: definition in 2000, development until 2005, deployment until 2008, followed by actual operation. [3]

BIBLIOGRAPHY

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- [2] <http://www.esa.int/navigation/>
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