

**European Parliament**  
**Committee on Foreign Affairs - Subcommittee on Security and Defence**  
**Brussels, 2 May 2007**

**Public Hearing: “The Contribution of Space to ESDP”**

**III. Which space systems are needed for ESDP?**

**c. Space-based navigation-positioning**

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The constant and secure availability of a navigation, positioning and timing service is a fundamental requirement for the regular functioning of our modern society.

In the past 20 years, a Global Navigation Satellite System (GNSS) has become a key strategic assets for civilian, security and military applications.

GNSS today has become the backbone of any modern military organisation.

Currently, European users (including defence) rely on the only available GNSS system, the American Global Positioning System (GPS); GPS provides two different services: an open one to all users, and a restricted one (GPS-M) dedicated to the US forces and their allies. GPS has been developed according to US Department of Defence's requirements and the ultimate control of the GPS system is in the hand of the US supreme authorities (Security Council); it is explicitly foreseen that GPS services can be disrupted by US authorities according to specific security situations.

It is foreseen that the current second generation GPS system will be upgraded to the third generation, providing better performance and reliability, in the next years.

Most European countries have in their military inventories GPS-guided munitions and GPS receivers are usually embedded in any air, naval and, more recently, land platforms as well as in most Army units.

The whole concept of Network Centric Warfare and Network Enabled Capabilities relies on the constant flux of information and situation awareness that GPS guarantees.

Russia is currently re-vitalising the GLONASS constellation, while China is on its way to produce nationally a new system, named Compass.

Following a difficult transatlantic debate concerning the actual need to duplicate the US-controlled GPS, in 2002 the European countries decided to proceed in the construction of a European GNSS system.

Possibly by 2012, thanks to a joint EC/ESA initiative, Europe will manage a new Global Navigation Satellite System (GNSS), called Galileo<sup>1</sup>.

This endeavour is currently experiencing some major difficulties, mainly of political and industrial nature, more than technical one.

As an external observer, I can only notice how at the same time these obstacles underline the plus and minus of joint European programs: while it is true that it would not have been possible for any European member state to procure a GNSS nationally, hence making cooperation indispensable, the model of cooperation chosen is not truly European, as it still reflects national biases, mainly because of the application of the industrial “juste retour” principle.

When completed, this system will consist in a constellation of 30 satellites, providing users equipped with the proper receiver, the possibility to know with extreme accuracy their position, as well as to access advanced navigation services.

Despite its widely known and publicly acknowledged civilian character, the European Galileo GNSS system has intrinsic security implications and uses.

Given the strategic value of the system, an adequate protection of the ground infrastructures and radio signal is necessary, as they can become a target of opportunity for terrorist organisations or hostile countries.

Integrity of the signal, in particular PRS, could require further research and investments in encryption techniques, while the protection of the space platform could be enhanced by physical hardening.

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<sup>1</sup> For further details, see Giovanni Gasparini, Gustaf Lindström, *The Galileo satellite system and its security implications*, EU-ISS occasional papers, n°44, Paris, April 2003

Some level of redundancy of the space and ground segment would be required (such as spare satellites and launch-on-demand facilities and contracts); moreover, in order to deter potential attacks from State actors, it has to be clearly stated that it shall be the policy of European member states to consider a deliberate attack against Galileo as an act of war, requiring an adequate retaliatory response.

In addition to that, possible hostile uses of the positioning signals must be expected and should be avoided by a strict control to access, guaranteed by the Galileo supervision authorities, thus allowing disruption and distortion of service where and when needed. The technical means to act accordingly shall be provided for, as well as a clear identification of the political authority in charge of these critical decisions.

Moreover, Galileo is also a good candidate for direct use by European military forces. The Galileo “Public Regulated Signal” (PRS) in particular can be compared to the GPS-M signal, the military-only precise and jam-resistant service provided by the US for its military and to the closest allies. Therefore, the use of the PRS signal by military and security forces cannot be excluded; European militaries can benefit from including PRS receivers in their systems and should be encouraged to do so.

The technological and industrial benefit of mastering a complex navigation system, without the restrictions imposed by “black-boxes” and limitations due to a restrictive US technology transfer regulation, would improve the operational capability and ease the signal integration in most weapon systems.

The optimal configuration would be a dual-capable PRS and GPS-M system, thus incrementing precision and availability and maximum asymmetrical potential use (which implies negation of Galileo signals access to potential adversaries).

This would require a strong transatlantic cooperation at the political and industrial level as well.

A critical decision should concern the accessibility to PRS receivers; PRS signal and therefore receivers should be reserved to military force with a high level of security clearance.

Police and Public Safety services do not need constant access to the PRS level of accuracy (except in possible specific situations that should be clearly defined) and should be granted access to the remaining Galileo services, such as:

- the open access service, addressing mainly the mass market;
- the commercial service, intended for professional users requiring guaranteed performances;
- the safety-of-life service, for applications where human life is at risk, hence requiring integrity of information;
- the search and rescue service, to localise distress events and support rescue operations

Access to PRS technical specifications and production of PRS receivers must be placed under strict control and all the necessary measures shall be put in place, thus avoiding misuse, potential technology transfer and reverse engineering by non-European countries, even those partner of Galileo such as China, India and Israel.

The main issue, however, is political: managing the security aspect of Galileo require the establishment of a strong, constant and collaborative exchange of information and joint management at the transatlantic level.

In order to become the backbone of European and ESDP forces, Galileo still needs a strong backing from European institutions, in particular:

- recognising the relevant security and defence implications of this dual system
- establishing a clear political and operational chain of control and command with the fullest authority over Galileo, thus guaranteeing its proper use and asymmetrical advantage in case of crisis
- establishing a high level political and operational transatlantic framework to exchange information, discuss and coordinate the respective GNSS
- restricting the access of PRS signal and receivers to defence stakeholders
- enhancing the protection of the systems
- controlling the technology transfer to third parties

#### **IV. The cost of Non-Europe in the area of satellite based systems**

A significant number of space assets for security and defence purposes are currently procured and operated by many different European member states.

Space-based communications, observation, information gathering and navigation capabilities represent the backbone of the ongoing process of transformation of the military forces towards interoperability, jointness, deployability and networking.

While space assets, by their very same nature, deliver the fullest when integrated in a unified constellation, each country is still developing national capabilities, and cooperation is mostly based on limited bilateral arrangements.

European member states currently procure some significant space capabilities, serving either their own single national purpose or multilateral needs; however, despite some agreements that allows some forms of cooperation between the different platforms and systems, as well as limited sharing of raw data, no single European system is envisaged.

According to known national plans, in the next 5 years the total number of dedicated security communication satellites will move up from the current 7 deployed to 10, as new platforms are launched after a 5 to 10 years period of R&D and procurement that started in most cases in the early 2000.

Currently, European nations are spending about 500 million Euro per year over the 15 year period of service of such capabilities.

As far as observation is concerned, according to publicly available information, the current low capability (3 satellites) will increase significantly to 12 satellites of different kinds, as 4 different national programs reach maturity by 2012; however, given the relatively short in-orbit life of each platform (5 to 7 years), the availability will drop back to the present level by 2017, and no platforms would be orbiting by 2022.

Any capability-driven estimate of future needs to serve ESDP purposes is particularly complex and fundamentally affected by the initial assumption made; in the next 15 years:

- the process of transformation of military instruments towards NCW will continue
- the European security involvement in remote areas will increase
- European internal security will require substantial surveillance capabilities
- the cost of security-dedicated space systems will not change dramatically

Given the relatively short in-service life of the platforms, in particular in the observation field, the relatively rosy situation of 2012 will not be sustainable, as satellites reach their operating ends in the following 5-10 years.

Given the typical life cycle of space platforms, the political authorities should start immediately to plan and fund the future projects to be deployed from 2012 on.

Investments in the period 2007-2012 are already determined with a significant level of accuracy, while few funds are already foreseen from 2012 on.

As far as **SATCOM** is concerned, a dramatic increase in requirements is foreseen, as the ongoing process of transformation towards IT-dependent military forces continue.

Some of the bandwidth requirement will be satisfied by an increased use of commercial satellites, in particular supporting voice data of less critical nature. But some critical communication tasks, such as transferring of secret data and imagery, or real-time command of troops and unmanned vehicles of any kind, cannot be transferred to civilian communications, because of the specific security level required and the absolute need of error proof performances, as well as because of the technical requirements of bandwidth (mainly EHF).

A strong R&D effort in future EHF capabilities and secure communication software is therefore needed, as most of planned assets lack significant modern EHF capabilities, a key requirement for their use in support of military and security forces.

The need for secure EHF transponders is key and will be further stressed by fielding of UAVs; moreover, the fielding of intelligence gathering satellites operating real-time will add further pressure to develop satellite-to-satellite communications, thus developing DRS capabilities.

We can therefore foresee an additional need of some 2-3 satellites (each with capabilities comparable with current Skynet or Syracuse platforms) already in the next

5-10 years, with a significant increase to reach the level of 18 satellites by 2022, thus renovating in 15 years the whole fleet with modern satellites.

The proposed additional 8 dedicated platforms over the 2012 level, mainly with significant EHF capabilities and DRS features, is due to the foreseen increase in number of missions abroad and the simultaneous introduction in service of non-space platforms and assets that will need an extensive use of bandwidth to operate jointly and real-time (UAVs in particular)

18 in-orbit platforms would guarantee a global coverage with 6 satellites in-sight from any part in the globe, that could be considered enough to support net-centric enabled operations, real time command and control and continuous transfer of data collected by observation and intelligence-gathering satellites (DRS function).

**Observation and intelligence-gathering capabilities** developments are strictly connected with the external dimension of ESDP.

As the European Union gets involved in risky and geographically far missions, as well as surveillance operations of borders and treaty compliance, the all-weather, 24h-365d real-time access to information worldwide becomes a key instrument both for decision making as well as strategic and tactical use.

Some 2 satellites will be needed (each with capabilities comparable with current Cosmo-Pleiades platforms) already in the next 5-10 years, with a 2017-2022 increase to reach the level of 16 satellites by 2022, replacing completely in the next 15 years the fleet with new satellites.

The proposed additional 2 dedicated platforms over the 2012 level, with SIGINT-ELINT capabilities, is required to cover a total gap in the inventory of European assets, where space electronic intelligence is not currently available.

The final level of a mix of 16 in-orbit platforms of different kind (optical and radar observation, as well as signal and electronic intelligence)

Of course the sum of national assets does not provide a comparable capability given by a single space constellation with the same number of platforms, as it is specifically the integration of data and services that guarantees the multiplier effect typical of space assets.

Moreover, the fragmentation of spending in a number of different projects is bureaucratically expensive and generates unnecessary duplications in operational terms (such as un-coordinated movement of observation satellites over the same territory, for example), in particular in the ground station segment (multinational programs so far requires each nation to develop its own ground segment, as in the case of Helios I).

It remains very difficult to estimate a figure of how much European countries could save if they choose to pool their national spending, as the capability outcome would be radically different.

Moreover, the gain would not be only purely in economic terms, as a single constellation would by nature provide a far better operational asset than even a larger (in terms of platforms) availability of un-coordinated satellites.

Interoperability will be enhanced, too, as the governance structure would be simplified and sharing of data and swap of capabilities would become the rule, not the exception.

However, the alternative is not just between spending more wisely in a pooled European effort versus wasting money on national projects that are by nature less capable and efficient, as they cannot guarantee the global coverage needed by current and future requirements. The alternative today is between guaranteeing future funds for a common effort or being left without any significant space capability by 2022, as most European countries, with the partial exception of France, do not seem in the position of spending enough resources even to replace the same level of capability that will be reach by 2012.

Therefore, the option that European governments and institutions faces today is between building a single space constellation, common since its start in the R&D phase, or being left without significant capabilities, not to mention the additional needs that arises from the development of ESDP engagement in distant areas, as well as obligations deriving from treaty-compliance measures and the need to guarantee a better surveillance at the EU borders.

The European way therefore is not just an opportunity to save taxpayer's money, it is the only opportunity left to maintain a significant capability in the medium term.



However, it would not be possible to reach this goal without the support of a coherent European political and institutional framework; the integration of European space policies, R&D, procurement and management could become a reality thanks to a incremental approach of sovereignty-sharing.