La politique spatiale de défense au service de la sécurité

The defence space policy contributes to security

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SYRACUSE 3A SYRACUSE 3B

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LAUNCH OF THE SYRACUSE 3B SATELLITE

KOUROU - AUGUST 2006

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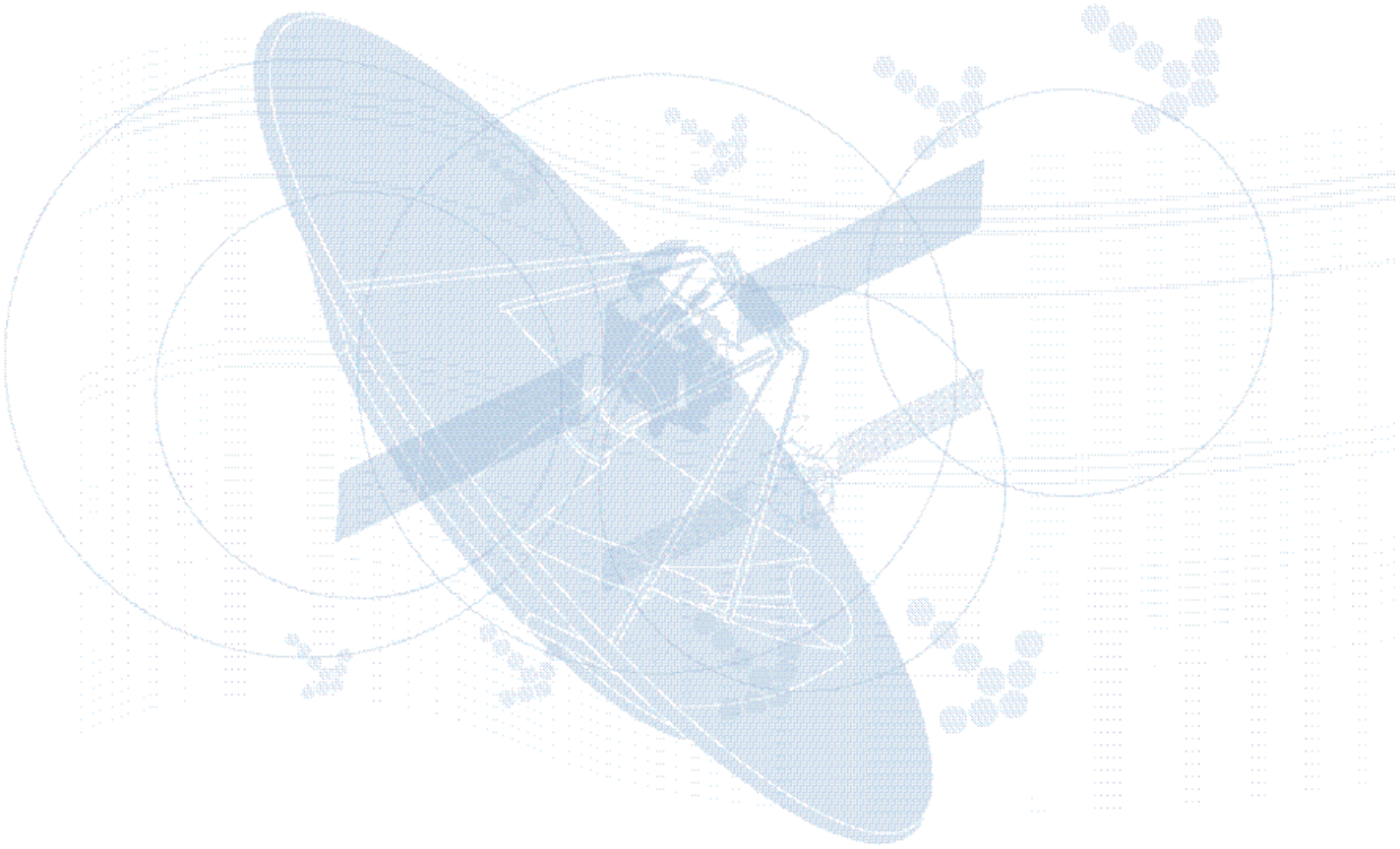


THEME 1

▹ Defence and Space programs

The Defence Space trends

In order to guarantee its own security and fulfil its international responsibilities, France continuously enhances its capability to anticipate and evaluate crises, and its effectiveness in managing these crises. Moreover, France develops the resources required to lead, as a framework-nation, military operations of coalition forces[2].

Given the political, military and economic stakes of Space program, and the technological potential they offer, Space represents a unifying project likely to contribute to strengthening the position of the European Defence and its crisis management capabilities.

The conclusions of the Strategic Defence Space Policy Steering Group (GOSPS) in September 2004 emphasized the significant role of Space for the main strategic Defence functions. Since then, an impetus for the future has developed, within the Ministry of Defence and at the interministry level, driven by the Ministry of Defence's strong confidence in the strategic, technological and industrial contributions of Space to the preparation of the future.

The military Space planning also takes into account the operational requirements of the armed forces and intelligence services. Developed with a view to achieving economy of resources, consistency with force systems and synergy with civilian Space policies, the planning seeks to balance the requirements for national Defence, while taking full account of political, economic and industrial constraints.

Within this framework, France's military Space trends hinge on seven axes:

- **Continuing and upgrading** sovereignty Space systems: military telecommunications (Syracuse) and optical observation (Hélios), in order to fulfill its fundamental needs until 2020.
- Having **"all-weather"** intelligence capabilities as soon as possible.
- Seeking **cooperative solutions** in Europe, based on the initiatives of the European Defence Agency (EDA).
- Integrating Space systems into the ***information command and control force system***, with a view to harmonizing, at the national and European levels, ground segments and ensure the interoperability of information systems.
- **Preparing for the future** through demonstrators and technical/operational studies, by targeting solutions shared at the European level.
- Support for **dual European Space projects** (access to Space and Space surveillance, Galileo for navigation and GMES for observation in terms of civil security), or **dual international Space projects** (meteorology, oceanography, geography).
- **Supporting the French Space activities**, whose 20-year strong history enables economic solutions and the conservation of unique competences in Europe.

1 - Vows expressed by Michèle Alliot-Marie, minister of Defence, to manufacturers on Wednesday 11 January 2006 :
2 - Global Monitoring for Environment and Security.

The military Space budget

The French military Space budget remains rather stable at around € 500 million, except in 2000 when it was approximately € 400 million. For 2006, the funds to be allocated to Space program, in addition to the research-Defence budget (BCRD) are as follows:

- Programme Authorizations (AP): approximately € 517 million;
- Anticipated budget allocations (CP): approximately € 489 million.

The main budget items are broken-down in upstream research and development program as follows:

Main budget item	AE 2006 (M€)	CP 2006 (M€)
Upstream studies	93,9	62,2
Hélios 2 program	121,2	96,4
Observation ground segment program	22,8	19,3
Syracuse 2 program	4,6	16,3
Syracuse 3 program	252,2	276

The allocations planned for 2006 are sufficient to fulfill the objectives and time-scales specified for the military Space program in the military budget law (LPM), which covers the 2003-2008 period. The main axes are:

- **Developing the second generation optical observation system:** Implementing the national Observation Ground Segment (SSO) program. The SSO program develops the resources required to enable the French ground segment to use efficiently the observation systems offered by both France (Hélios 2) and Germany (SAR-Lupe), as well as the observation radar systems offered by Italy (Cosmo-Skymed). The SSO program will provide an "all-weather" observation capability in 2007.

- **Increasing communication satellite capabilities** with the launch (after Syracuse 3A in October 2005) of the Syracuse 3B satellite in August 2006, which will finalize the heart of the future strategic networks.

Like in 2005, Defence Space activities are particularly rich in 2006.

3- The Hélios 2 system brings together five European countries. These include the partners in the development of the system (France, Belgium and Spain), together with those sharing access rights (the Italian Cosmo-Skymed radar systems and the German SAR-Lupe). These rights were negotiated with Italy as part of the Turin Agreement in January 2001 (Franco-Italian inter-governmental agreement on Earth observation), and with Germany as part of the Franco-German agreement for investigating the possibility of sharing between Hélios 2 and SAR-Lupe in July 2002.

Operational applications of Space

Space resources are omnipresent in several military areas, which are described in the following strategic functions: **deterrence, prevention, projection and protection.**

The use of extra-atmospheric Space represents a major strategic interest for Defence, thanks to the capabilities it offers in terms of data collection and transfer on a global scale. It complements the use of other sensors and vectors. However, its intrinsic qualities of global, unique and permanent service – without infringing the sovereignty of a country – make it a prerequisite to every military operation.

The operational applications of Space are telecommunications, observation, eavesdropping, navigation and localization, geography, oceanography, meteorology and advanced alert.

Space is indeed a totally free circulation domain. Therefore, unlike conventional means, satellite owners are provided with the following abilities:

- **Discretion,** with a "non–intrusive" access to the whole globe, i.e. without violation of national territories.

- **Permanence** with the collection of strategic, operation and tactical information at any time, in any place, and with a certain repetitiveness, which gives authorities the decisive contextual elements enabling to anticipate crisis situations or manage conflict situations. This ability is mainly developed via observation systems (both optical and radar), electromagnetic eavesdropping systems, Space surveillance systems and alert systems provided to the national territory or the forces deployed in operational theaters.

- **Consistency** with collected information, which allows on the one hand to know the environment of the zones of intervention, and on the other hand to transfer exact data in terms of positioning and timing to all the players, thus helping them move carefully and synchronize mutually. These capabilities are accessible via observation systems (that contribute to producing cartographic data, developing "field digital models", and having knowledge of meteorological and oceanographic conditions) and via satellite radio navigation systems.

- **Rapidity** in the circulation of all types of data, reinforcing or even replacing ground infrastructure networks and submarine wires. Such capabilities may be obtained through the use of Space networks mainly based on geostationary satellites dedicated to providing telecommunications, broadcasting or multimedia services (high-speed Internet access by satellite).

Hence, from a military point of view, Space is one of the best possible positions from which to carry out observation, communication, location and coordination, which are central to achieving military superiority and guaranteeing security.
When used in support of, or in replacement of, other evaluation, intelligence, command and control, and crisis management resources, Space technology provides governments and military leaders with the information to conduct their security and Defence policies.

In a geostrategic context more than ever characterized by instability, the unexpected and the appearance of new, varied risks, the use of Space as a lever to magnify the available force is an essential component of all strategies and an undeniable strength factor.

The scientific and technological stakes of space

Access to space provides many opportunities for technological research and development in areas which have hitherto largely been ignored.

Five scientific stakes in response to major questions facing mankind:

- Earth sciences: Understanding of the oceans and climate, interactions between aerosols, clouds and radiations, investigations into reflected solar radiation, atmospheric chemistry, Space geodesy, disaster prevention and response to natural hazards, etc.
- Sciences of the Universe: Astronomy, astrophysics and exploration of the solar system.
- The sciences of materials and biological systems in zero gravity (manned flights).
- "Exobiology": The origin and evolution of life.
- Fundamental physics (fundamental interactions and gravitation).

Technical stakes in telecommunications, observation and navigation :

- Space telecommunications services are in direct competition with terrestrial telephony, broadcasting and multimedia systems. They are also used in medicine (telemedicine, tele-epidemiology and health monitoring, tele-assistance, tele-consultation) or in education (tele-education).
- Earth observation has resulted in a number of environmental applications (global environment monitoring, climate forecasting) and Defence applications. This technology also has commercial and public or private service aspects. The ground segments are an essential component of the overall system.
- Worldwide satellite navigation systems offer resources for navigation, positioning and synchronization. Access to these systems is essential for political, economic and strategic independence.

Regarding these stakes, the French and European Space access capabilities must be preserved. With expertise in critical Space technologies and satellite system architecture, the French Space Agency (CNES) is a leader in this area, carrying out projects at the leading edge of current knowledge and developing "end-to-end" technological capabilities.

4 - Global Monitoring for Environment and Security.

The synergies between civilian and Space programs

Space research may be broken down into the four following key areas:

- The study and exploration of Space.
- Earth observation.
- Terrestrial services (telecommunications, localization, timing, human life preservation, etc.).
- Space resource control (launchers, enhanced satellite costs and performance, etc.).

Excluding Space exploration, which at present has little relevance to the challenges facing the national Defence capabilities, all of these areas of study are of equal interest to both the civilian (institutional and/or industrial) and military sectors. The synergies are therefore numerous and there are real possibilities of optimizing Space budgets in the areas of Earth observation, oceanography, meteorology, navigation, Space surveillance and telecommunications. The close collaboration that exists at a national level between the French Procurement Agency (DGA) and the French Space Agency (CNES) demonstrates the valuable use of these synergies which extend from the most fundamental upstream research to operational program.

Likewise, the success of the Hélios program may be attributed to the strong synergies between the Hélios 2 and SPOT V program. This is an example of the growing technological links between the civilian and military program, leading to a reduction in the program' development costs. This technological partnership is also robust in the development of the French Pléiade satellite program. These high-resolution optical satellites will come into operation in 2008. It should also be mentioned that the Telecom 2 satellite carried both civilian and military payloads (Syracuse 2).

As regards services provided by Space systems, some military requirements demand cutting-edge technical specifications which are sometimes a lot higher than those that would be required on the civilian market. This is particularly the case in relation to observation accuracy, anti-jamming capabilities, data confidentiality or specific signals eavesdropping. In some cases, dedicated military systems need to be developed.

On a European scale, the European Space Agency (ESA) carries out civilian research and development program on behalf of its fifteen member states. This agency bolsters the emergence and implementation of cooperative civilian Space program, by offering a proven framework for controlling common budgets and carrying out projects in response to the common requirements of a number of European countries, including the Ariane, GalileoSat and GMES programs. However, the ESA has no authority to include military program within this area of cooperation. These cooperative program, normally featuring only a restricted number of partners, are usually developed within dedicated program structures (e.g. the Hélios program).

Space and the European Defence

With the implementation of a **European Security and Defence Policy (ESDP)** in June 1999, Defence has become a major component of the European Union foreign policy. Its initiatives, just like diplomatic, economic and financial actions, are fully integrated in the EU global approach of crisis management, which aims at countering the complex and numerous threats resulting from the recent developments in the global strategic environment. In this context, the possibility for Europe to have capabilities to act autonomously underpins the effectiveness of its military initiatives. Such capabilities include intelligence, command and communication systems, surveillance and navigation, i.e. areas which today all depend on Space resources.

However, in order to fill the identified capacity gaps, the budget constraints imply the preferred use of dual technologies on the one hand, and the systematic search for multinational solutions on the other hand. This need is particularly present in the area of military Space, which requires considerable investments that a number of European countries cannot afford. Europe has to seek synergy among its members in order to optimize their own capabilities, which are too often competing against one another, so as to make the most of Space use, while not being subjected to the domination of the very few nations whose national resources enable to take on the necessary investments.

The European Defence Agency (EDA), founded in July 2004, has initiated the coordination of its members' Space resources. Well aware of the interest of such efforts, France favours a European partnership approach for its military Space program in the areas of strategic intelligence and telecommunications. The Chief of the Defence Staff holds a major role in this area within the ECAP[5] groups and through relations between the Staffs of our European partners.

In the area of observation:

- The Hélios I program was carried out in cooperation with Italy and Spain. An agreement which is about to be signed aims at making Hélios I images available to the European Union via its Satellite Center.

- The Hélios 2 program was conducted in cooperation with Belgium and Spain. Italy and Germany are also to have an access to the Hélios 2 system, under separate agreements for the sharing of capabilities with their national radar systems Cosmo-Skymed and SAR-Lupe. These exchanges will result in "all-weather" intelligence capabilities. Other negotiations are currently in progress with the EU and other European partners.

- The other improvement expected in this area is the development, with a maximum number of partners, of a generic ground segment (which is more rallying than satellites, which are always considered as national symbols).

In the area of telecommunications:

- The national Syracuse 2 and Syracuse 2I program are extended by cooperation with the United Kingdom, Belgium, Spain and Germany (hiring of capacities, coverage extension and mutual assistance in the event of the unavailability of a satellite). For the next four years, France is therefore to provide 2/9 of its SHF capacities to Germany under a Memorandum Of Understanding signed in 1999[6].

[5] *European Capabilities.*
[6] *Which allows the Germans to have X-band capacities, before the implementation of Satcom BW*

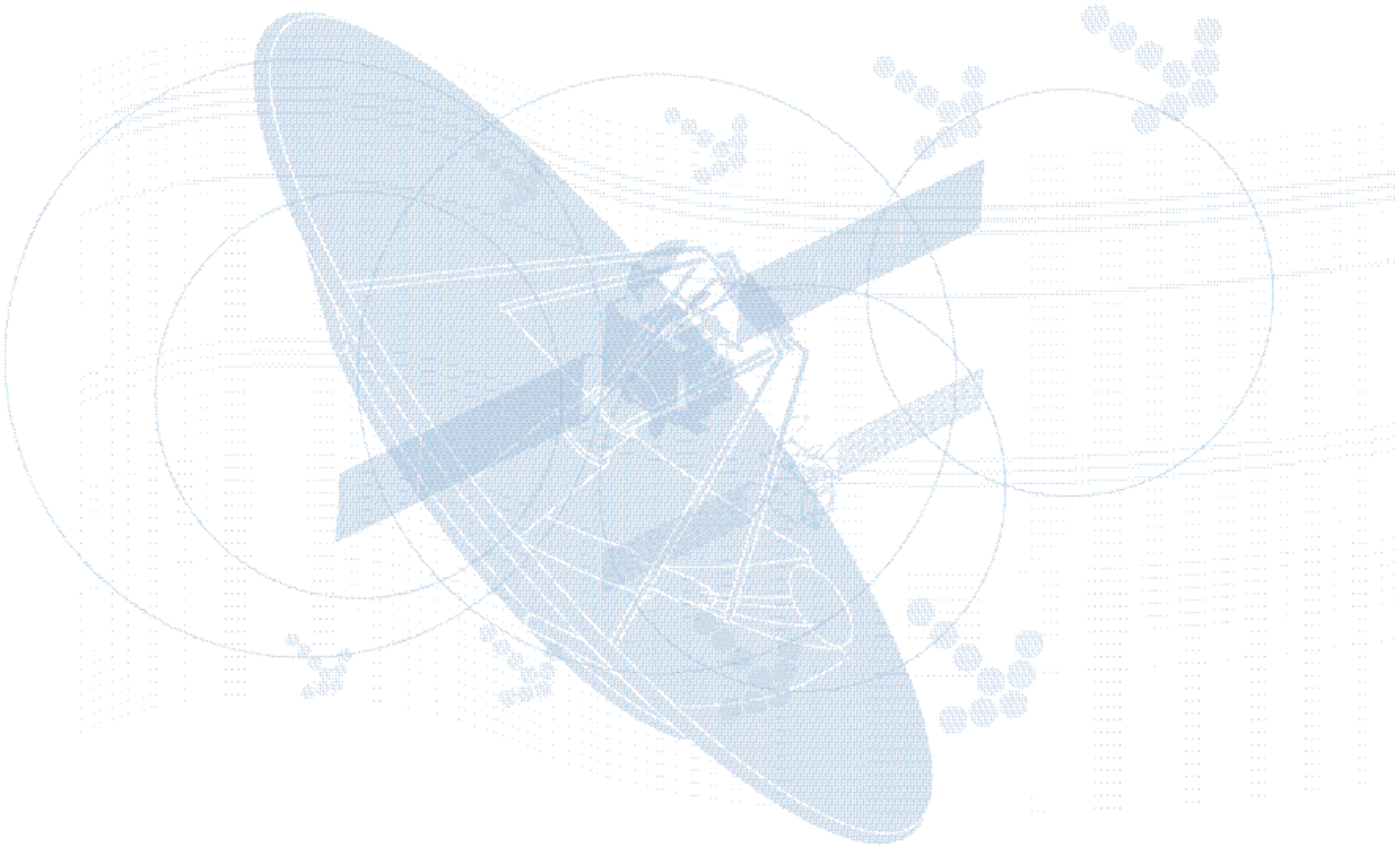
- NATO has also selected Syracuse 2I as a communications provider together with the British Skynet and Italian Sicral systems. The **NATO SATCOM V** program is therefore a success in terms of European cooperation.

- Partnership with Italy appears as the best solution to complete the initial capabilities of Syracuse around 2010. With the Athena-Fidus project, France and Italy are exploring, via the CNES and the Italian Space Agency (ASI), the possibility to launch a satellite dedicated to high-speed non-secured telecommunications, which would be based on civilian technologies. Other European partners could be interested, and could have part of the satellite capabilities at their disposal. This initiative could give birth to a European Space telecommunications system.

European access to Space is conserved with the Ariane 5 launcher. The arrival of the Soyouz Russian launcher and the Vega Italian launcher will adapt, from 2008, the commercial offer to the institutional and commercial satellites. The network of European launchers is supported by direct financial participation, support from the ballistic network and the preference for European launchers[7].

Finally, from 2008 onwards, Europe will have an accurate timing and autonomous positioning satellite system, Galileo, which is similar to the American military system, GPS[8]. Although Galileo is a civilian system, it will offer secured services, which can be used by Defence. The European community and intergovernmental institutions will manage this system. Considering the strategic stakes of such a program for the EU and its member countries, the armed forces could legitimately and relevantly use it.

[7] *Ministerial committee of the European Space Agency – Berlin - December 2005.*
[8] *Global Positioning System.*



THEME 2

▹ Military Space telecommunications

The Syracuse program

France no longer deploys in overseas theaters without using satellite communications capable of delivering high-speed data from compact easy-to-use terminals to isolated users in remote areas, over long distances. Fielded since 1985, the Syracuse system (SYstem for Radio Communication Using a SatellitE) provides all military communications between France and units deployed in operational theatres. It is used for command and control, intelligence and logistics, and reinforces France's position in international coalition forces. The Syracuse system is as the very heart of network-centric operations and provides "end-to-end" data transfers. It also connects tactical networks on the ground with the infrastructure or ship-borne networks implemented aboard the Navy's ships.

Three versions of the system have been progressively introduced to ensure continuous data flows and meet the ever-growing demand of the Armed Forces for higher throughput and additional services:

- Launched in 1980, Syracuse I program and its constellation of three Télécom 1 had its platforms operated by France Télécom and the Ministry of Defence. Programme Syracuse I reached its planned end of life in 1994.

- In 1987, Syracuse 2 program was launched to prepare the next version of the program. Two of its four Telecom 2 satellites (whose platforms were also operated by France Télécom and the Ministry of Defence), dubbed Telecom 2C and Telecom 2D, are still in operation. The last satellite of this generation, Télécom 2D, should reach a planned end of life by mid-2010.

- Syracuse 3 Program, launched in November 2000, plans to put two Defence dedicated satellites into orbit, to upgrade two sites for satellite control and communications management in Metropolitan France, and to deliver almost 600 new generation user ground stations between 2006 and 2014.

The missions of the Syracuse system have been gradually developed, from an initial strategic mission to operational and tactical missions at land and on sea.

The Defence Procurement Agency (DGA), which has been working as the general architect of the Syracuse program for 25 years, plays a major part in the drawing up of France's military Space policy.

The Syracuse program is managed by a multi-disciplinary team, supported by experts from the DGA, within the Observation, Telecommunications and Information Programmes Division (SPOTI). The DGA experts come from the Electronic Weapons Center (CELAR), the Gramat Research Center (CEG) and the Quality Assurance Division (SQ). The French Space Agency (CNES) also provides its expertise in Space systems architecture to the program management. So as to achieve the targets set out in the Military Specification Document (FCM) and meet all the military requirements, this team works in close collaboration with its customers, who are the following individuals or entities:

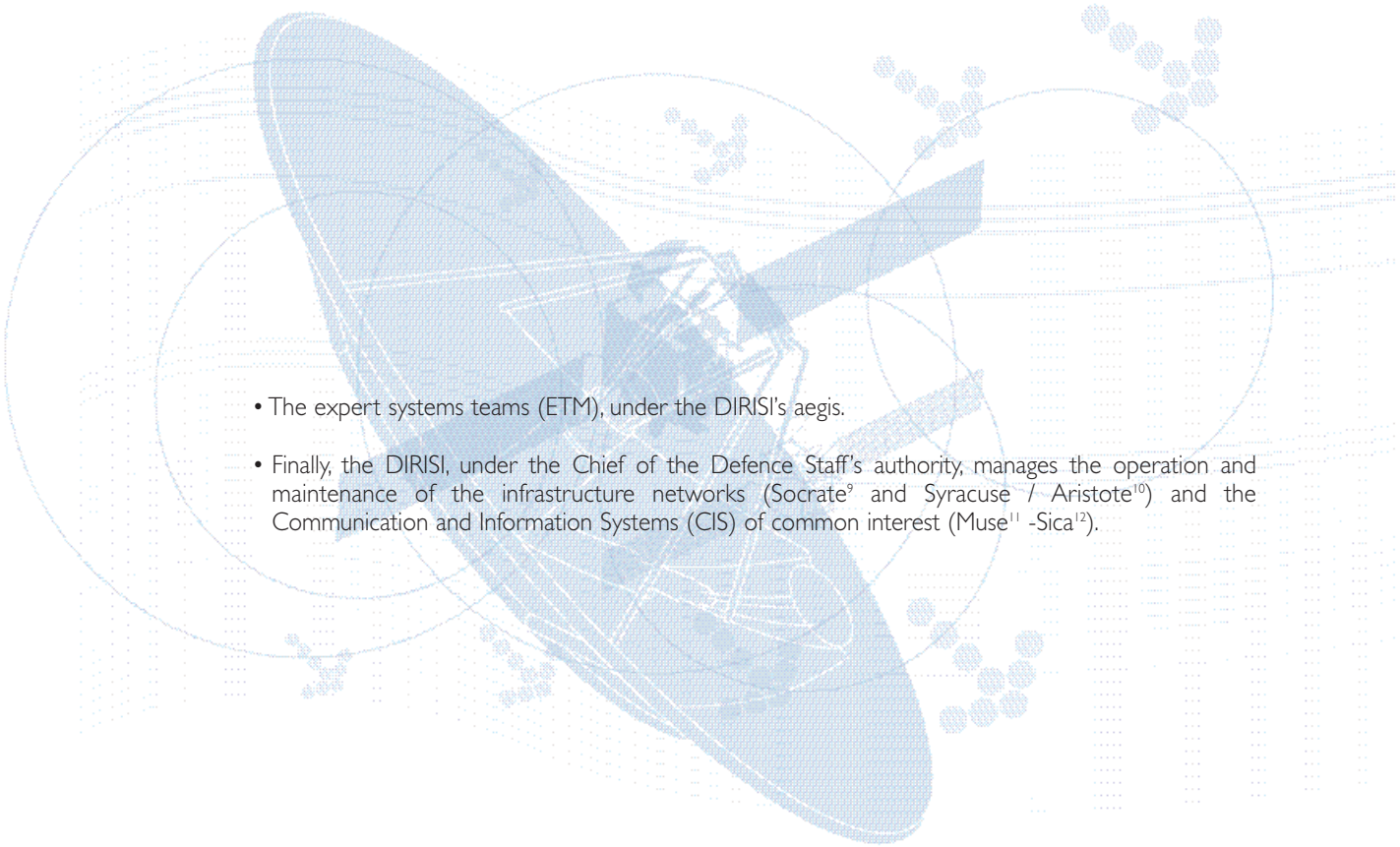
- The Syracuse program officer, from the Defence Staff (EMA).

- The assistance program officer from the Joint Directorate for Defence Infrastructure Networks and Information Systems (DIRISI).

- The assistant program officer from the Army Staff.

- The assistant program officer from the Navy Staff.

- The assistant program officer from the Air Force Staff.



- The expert systems teams (ETM), under the DIRISI's aegis.

- Finally, the DIRISI, under the Chief of the Defence Staff's authority, manages the operation and maintenance of the infrastructure networks (Socrate[9] and Syracuse / Aristote[10]) and the Communication and Information Systems (CIS) of common interest (Muse[11] -Sica[12]).

[9] *Operational system made of the armed forces' telecommunication networks.*
[10] *Long-range transit network.*
[11] *Secured universal email system.*
[12] *Military information and command system.*

Syracuse 3 Space segment

	TELECOM 2 (Syracuse 2 payload)	Syracuse 3
Orbite	**geostationary**	**geostationary**
Satellite weight	**2,300 kg**	**3,700 kg**
Dimensions of the main body	**2 x 2.1 x 2 m**	**2.3 x 1.8 x 3.7 m**
Extent of deployable structures	**22 m**	**30 m**
Global coverage	**1 x SHF**	**1 x SHF**
Fixed coverage	**1 x SHF**	**1 x SHF**
Mobile coverage (footprint diameter)	**1 x 2,000 km SHF**	**2 x 2,000 km SHF 2 x 4,000 km SHF 2 x 600 km EHF**
SHF Frequency Band	**3 x 40 MHz channels 1 x 60 MHz channels 1 x 80 MHz channels**	**9 x 40 MHz channels**
EHF Frequency Band	**/**	**6 x 40 MHz channels**
Total Frequency Band	**260 MHz**	**600 MHz**
Power (SHF / EHF)	**1.5 KW**	**6 KW**
Antijamming capability	**yes (TC/TM)**	**yes (TC/TM/Liaisons)**
Electromagnetic protection	**no**	**yes**
Satellite lifetime	**10 years**	**10.2 years**

The Satellite Control Center (CCS)

The Satellite Control Center (CCS) ensures the satellites' station operational support. It is based in Maisons-Laffite, within the DIRISI operations centre, whereas the relief control center is located in Favières, on the M3 site (Telecommunication and IT specialized center). If need be, the CCS can be activated at very short notice.

Civilian personnel specialized in satellite activities operates the Satellite Control Center. Its mission consists of:

- Drawing up and transmitting the demands pertaining to military payloads configuration;
- Maintaining the satellite in a window consistent with the military mission (i.e. the satellite should move within a North/South and East/West window of +/-0.09°).

The CCS uses advanced, strong links to remote control the satellites, while also ensuring their control via telemetric data processing and locating them.

Syracuse 3 ground segment

User ground stations

- 540 ground stations (among which 30% have dual (cimil) bands), with:
  - Antenna diameters ranging from 0.8 m to 4.5 m.
  - 1 to 16 simultaneous liaisons per station.
  - 19 Kbit/s to 2 Mbit/s throughput in secured / link mode.
  - 19 Kbit/s to 5 Mbit/s throughput in non-secured / link mode.

Manportable station

High-speed tactical station

Medium-sized light station

«Tri-band station»

Examples of autonomous ground stations, to which the armed forces will have access:

- **Manpack stations (P)** are easy-to-use, easy-to-carry stations, with a tactical function. They are used, for the most part, by special forces, especially for the transmission of intelligence. They only weigh 13 kg.

- **Manpack package stations (V)** fulfill an operative and strategic function. They are used, for the most part, for the Embassies' requirements in secured communications. They weigh 40 kg and can be split into two to be transported by vehicle.

Eventually, the manportable stations (P&V) stock should include 278 stations.

- **"HDTac"** stations have a tactical role. The first "HDTac" stations will be available in late 2006. A total of 95 units is planned. These stations offer 2 non-secure links. They can be implemented very quickly and enable to use, on any ground, cutting-edge communication means.
- **Medium-Sized Light Stations (ML)**, fitted on armored vehicles, have special, high tactical mobility. The can be air-transported without being dismantled. Eventually, the armed forces should receive 35 ML Stations.

- **The upgraded tri-band stations**, bigger than the "HDTac" stations, have 3 non-secure links. They can be implemented within two hours in theatres, for command posts. They enable to have a real-time dialogue and information transfers (Internet, visio-conferences, etc.). These stations can be connected to an infrastructure network. The Armed forces are to receive 64 units.

  - 45 maritime stations (among which 50% have dual (cimil) and bi-satellite bands), with:
  - Antenna diameters from 40 cm to 2.6 m.
  - 16 simultaneous liaisons per station.
  - 19 Kbit/s to 2 Mbit/s throughput in secured / link mode.
  - 19 Kbit/s to 5 Mbit/s throughput in non-secured / link mode.

Naval station

Light naval station

Submarine station

Costs and key dates in the Syracuse 3 program

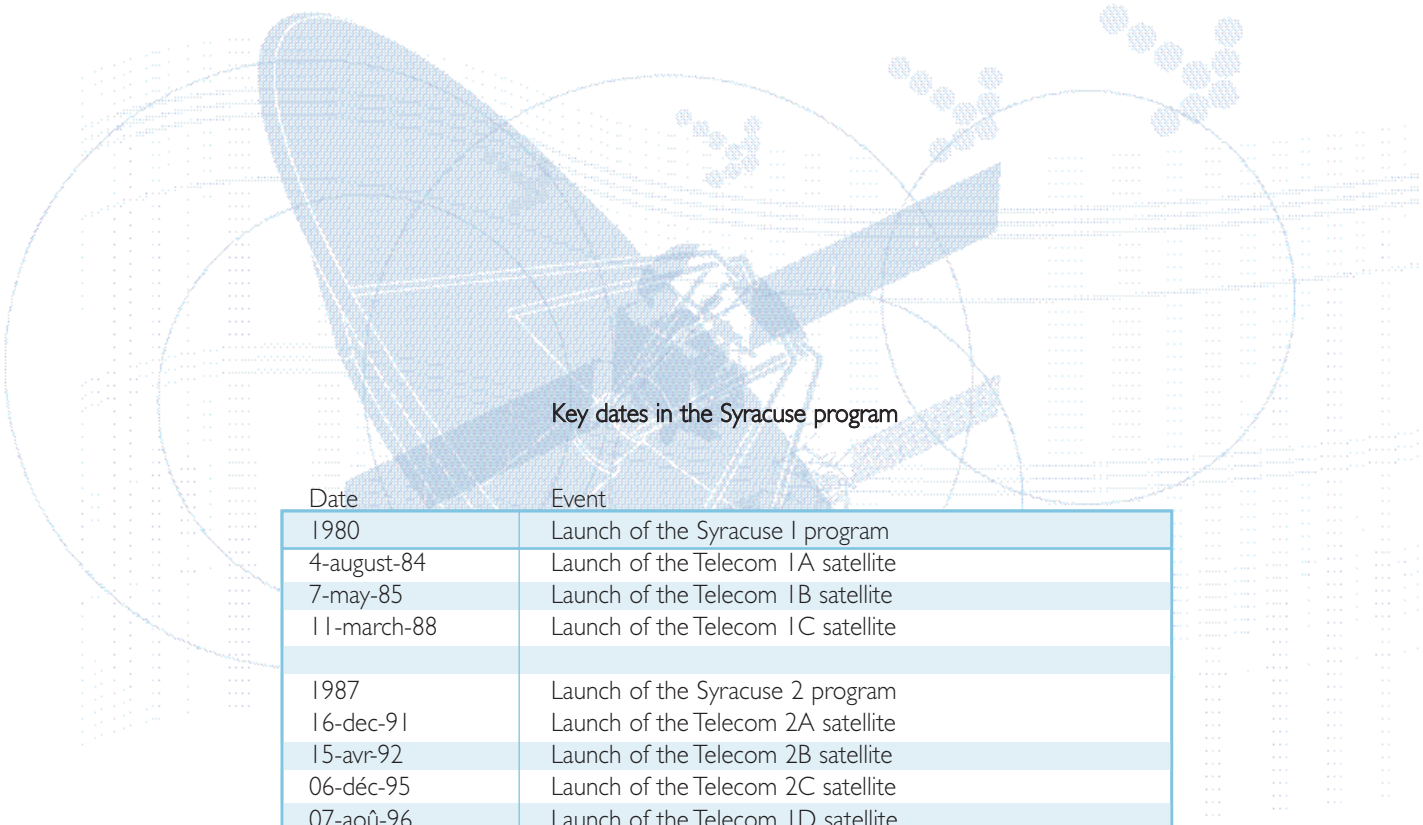
The cost of the entire Syracuse 3 is around € 2.3 billion. Spread over a fifteen-year period, this cost covers the whole program, from the initial specifications to the commissioning of the system. The overall program includes two satellites in-orbit (Syracuse 3A and Syracuse 3B), additional user ground stations and the refurbishment of the ground segment in Metropolitan France.


« La Lauzette » M4 station


18 m SHF antenna


11 m SHF / Ku antenna


2,4 m EHF antenna



Key dates in the Syracuse program

Date	Event
1980	Launch of the Syracuse I program
4-august-84	Launch of the Telecom 1A satellite
7-may-85	Launch of the Telecom 1B satellite
11-march-88	Launch of the Telecom 1C satellite
1987	Launch of the Syracuse 2 program
16-dec-91	Launch of the Telecom 2A satellite
15-avr-92	Launch of the Telecom 2B satellite
06-déc-95	Launch of the Telecom 2C satellite
07-août-96	Launch of the Telecom 1D satellite
1999	Launch of the Syracuse 2I program
30-nov-00	Allocation of phase one of the Syracuse 2I program
30-nov-04	Allocation of phase two of the Syracuse 2I program
End of 2005	Provision of the capabilities required by NATO
13-oct-05	Launch of Syracuse 3A - 47°E
16-dec-05	Delivery of phase 1 of the Syracuse 2I System to the Armed Forces
August 2006	Launch of the Syracuse 3B - 5°W
December 2006	Delivery of the first new-generation tactical ground stations (HDTAC)

Sharing capability with NATO

The NATO SATCOM V program aims to replace the present constellation of NATO telecommunication satellites (NATO IV) over the 2005-2019 period, by leasing services and capacities in SHF (Super High Frequency) and UHF (Ultra High Frequency) bands for national military satellites.

In May 2004, the joint proposal from the Italian, British and French Ministries of Defence was selected in preference to the competing American proposal. The trilateral European solution is based on the Sicral, Skynet and Syracuse national military satellites. Moreover, it brings together the main European manufacturers in the area: EADS, Alcatel and Alenia.

In line with the proposal that France and its partners made to NATO in August 2003, the three supplying partners and NATO Consultation, Communication and Command (NC3) Agency jointly drew up a Memorandum of Understanding (MOU). The twenty-six member states of the NATO Infrastructure Committee agreed in September 2004 to allocate funds to the Space segment of the program.

By becoming a NATO supplier, France has secured the future of its national system, Syracuse, which is to be used by twenty-six nations, within the NATO framework. The NATO contract stands as a recognition of the high quality of European technologies and of the capability of the Europeans to cooperatively manage the NATO SATCOM V international program.

The investment cost for the NATO-SATCOM V program is estimated at € 815 million (including the ground segment). The planned budget for the Space segment, including the operational costs over 15 years, approximately represents:

- SHF: € 380 million
- UHF: € 70 million
- EHF: € 190 million

The total cost amounts to € 640 million for the Space segment and € 175 million for the satellite control, the static ground segment and the modems.

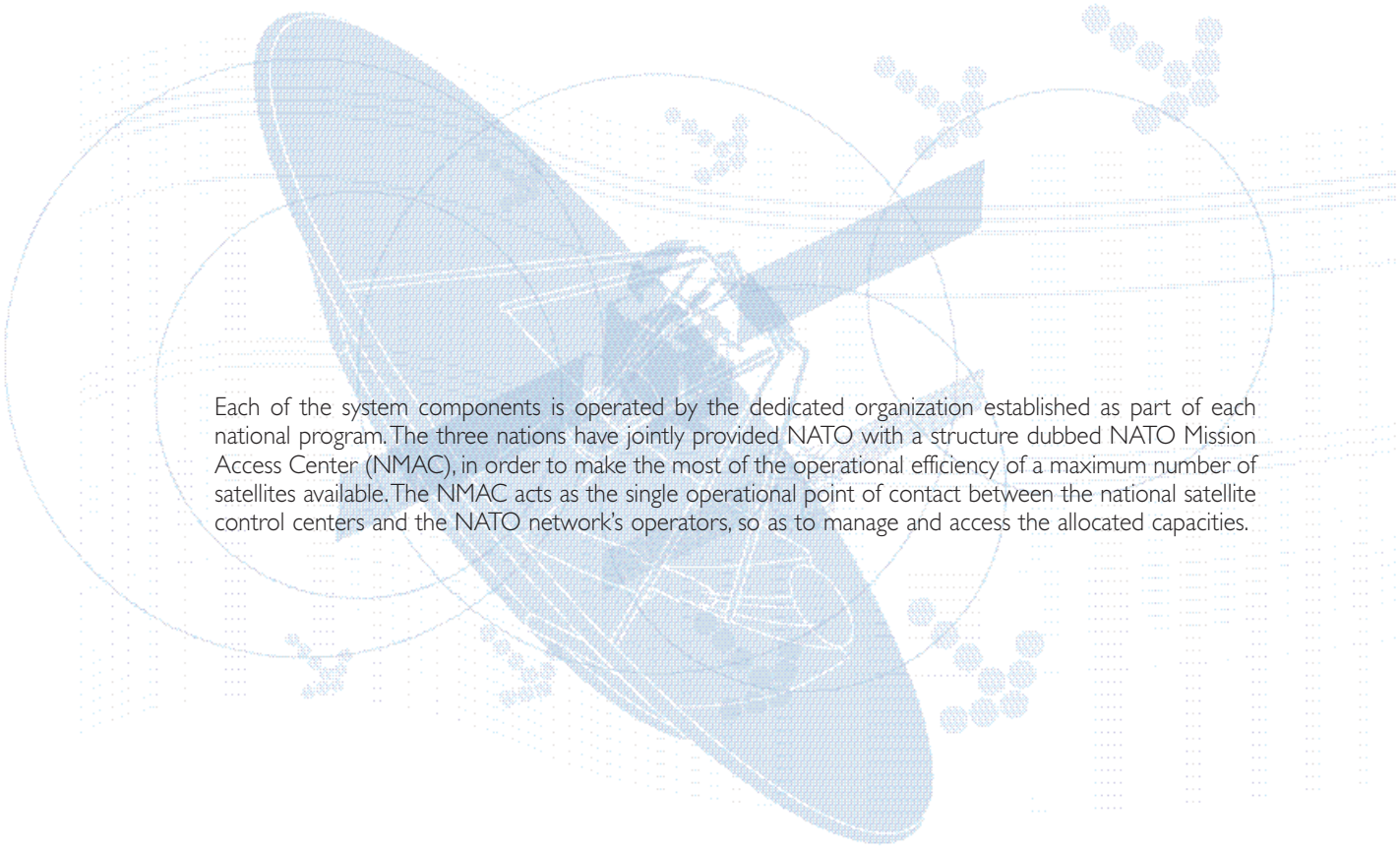
France is to earn up to about € 120 million, broken-down over the system utilization period, namely 15 years.

The SHF capacities to be supplied to NATO are broken-down as follows:

- 45% via Skynet (Great-Britain);
- 45% via Syracuse (France), that is more that a third of the SHF band capacities of the Syracuse 3A satellite.
- 10% via Sicral (Italy).

Sicral supplies 100% of the UHF capacities. If need be, Skynet is to provide backup (during the initial 2005-2006 period, an additional backup using commercial satellites is also under consideration).

The physical contribution of the French satellites is determined by the transmission capacities that are continuously guaranteed to NATO. Should jamming occur, Syracuse's antijamming capacities would be made available on request.



Each of the system components is operated by the dedicated organization established as part of each national program. The three nations have jointly provided NATO with a structure dubbed NATO Mission Access Center (NMAC), in order to make the most of the operational efficiency of a maximum number of satellites available. The NMAC acts as the single operational point of contact between the national satellite control centers and the NATO network's operators, so as to manage and access the allocated capacities.

Syracuse 3A operational operating process

The Syracuse 3A satellite was launched from Kourou on 13 October 2005 and fielded to the Armed Forces on 15 December 2005, following a series of tests aimed at ensuring that its performances met the Defence requirements. Ever since this date, it has been used to provide operational connections not only for the benefit of our armed forces, but also for that of our European partners, alongside the Telecom 2C and Telecom 2D end-of-life previous generation satellites. Placed in orbit at the 47 E orbital position, it enables to further-extend the zone covered by the Syracuse system all over the Indian Ocean.

The Joint Directorate for Defence Infrastructure Networks and Information Systems (DIRISI) sees to the management of the Syracuse network, via the Syracuse Planning and Control Center based in Maisons-Laffite, and the anchorage stations in Metropolitan France (in Favières and southern France).

At present, the satellite is used by all kinds of terminals, including naval and submarine stations. Syracuse 3A enables to connect units deployed with the networks in Metropolitan France or with one another in operational theaters. As a result, it enhances traditional phone or data transfer services, by generalizing collaborative works via the use of e-mail systems and Internet applications in national or international Command networks.

The traditional operating process of Syracuse 3A also provides our strategic partners with effective results. Consequently, NATO now uses a third of the satellite's overall capacities, while Germany uses about two ninths of these capacities. Nearly half the current system capacities are thus made available to these two players.

This satellite, which the Armed Forces were eager to receive, especially after the Telecom 2A and Telecom 2B satellites were decommissioned, has already met with success, as shown by the use of all of its capacities. The Armed Forces now count on the fielding of Syracuse 3B to meet their requirements.

Prospective: the future of Space telecommunications

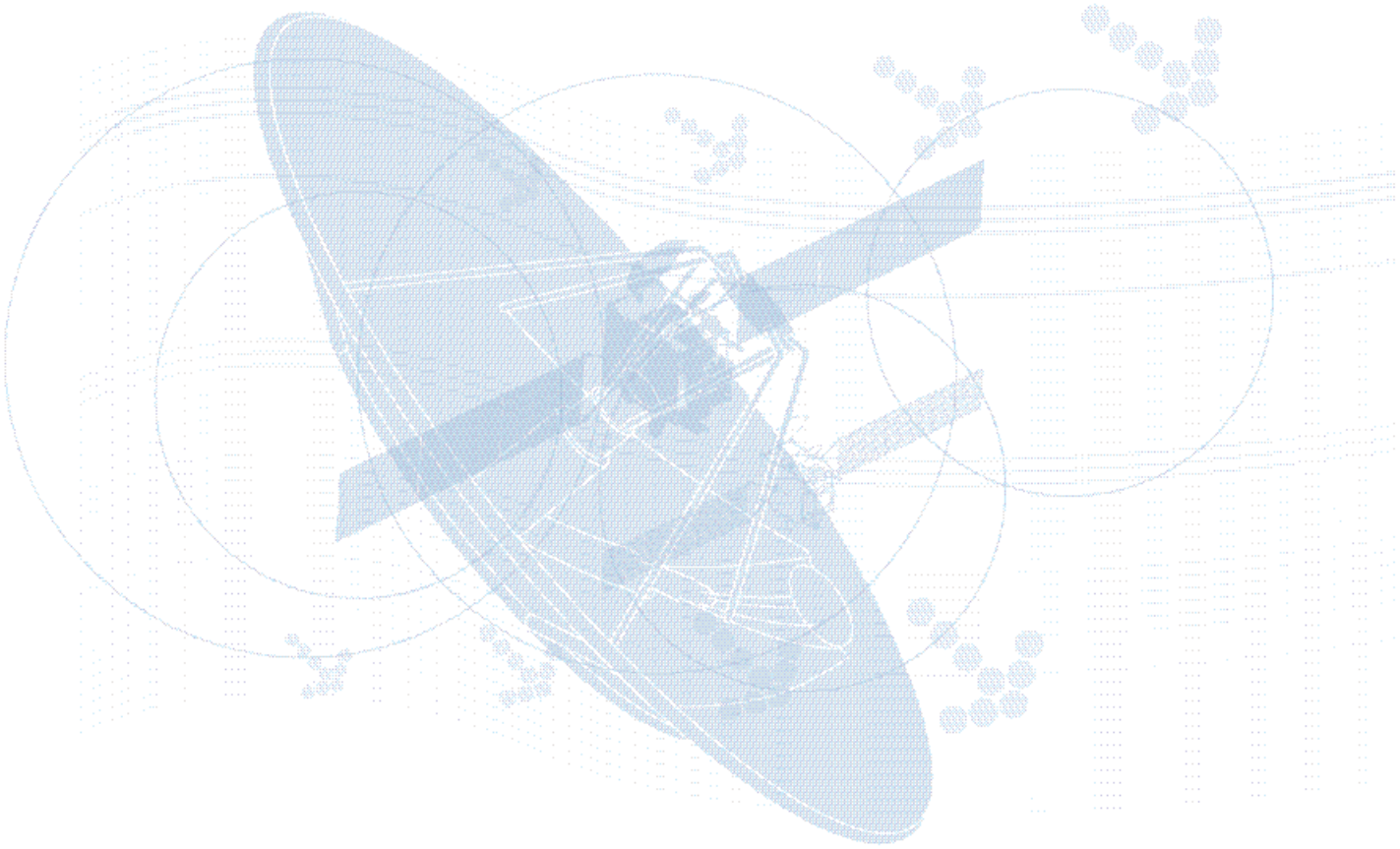
The growing use of military communications has become an essential matter for the European Defence and its various commitments. Hence, France, Great Britain, Italy, Spain and Germany already have or will soon have military telecommunication satellites.

The necessity of cutting down the ownership costs of satellite systems, while ensuring an optimum availability, obviously leads to favour inter-country cooperation. The approach should be pragmatic, as shown by this first tri-lateral cooperation in the NATO SATCOM V program.
Europe's capability to develop genuine cooperation in this area and to optimise dual-use, will be critical for the future of Space telecommunications.

France is to have its Syracuse 3A – Syracuse 3B satellite constellation as early as 2006. This new constellation will establish a nucleus of secured satellite communications. To meet its capabilities requirements in the middle-run (i.e. about 5 transponders around 2010-2011), France decided to bolster cooperative research in Europe. Some very positive contacts have been initiated with Italy to enable France to use part of the capabilities of the Italian satellite Sicral 2 (the signature of a Letter of Intent is under way). Separately, France is also considering renting some of the capacities of the satellites of the British system Skynet V.

From a technical angle, the current increase in requirements, which represents about 15% per year, is likely to go on. The whole governmental frequencies range should be used: UHF for low-speed mobility, SHF for highly secured telecommunications with a medium speed, EHF/ka for very high-speed telecommunications, on the battlefield and according to the concept of Network Centric Operations (NCOs).

France and Italy are analyzing, via the space sgencies of France (CNES) and Italy (ASI), the possibility of launching a satellite for **very high-speed, non-secured telecommunications based on civil technologies.** The project is called **Athena-Fidus**. This satellite weighing 3 tons would have a capacity of about 2.5 Gbits and 6 to 8 mobile light spots. Other European partners could be interested and could have some of the satellite's capabilities at their disposal.



THEME 3

▹ Defence and the Space industry

The European industrial and technological base in Space

The consolidated revenues of the European Space industry totalled € 4.4 billion in 2005, of which € 1,5 billion was accounted for by telecommunications, € 1,1 billion by launchers, € 0,2 billion by navigation and € 1,1 billion by observation. This represents a drop of 8,3% in comparison with 2004, during which the revenues for telecommunications had significantly increased (+ 45 %).

The European Space industry now centres on two large companies. These are the Franco-Italian company Alcatel Alenia Space (67% owned by Alcatel and 33% by Finmeccanica), formed by a merger between the satellite activities of the French telecommunications manufacturer Alcatel, of the Italian Defence and aeronautics group Finmeccanica in 2005, and of the European company EADS Astrium (100% owned by EADS in 2003, following its acquisition of the 25-percent share previously held by BAe Systems), especially with its French subsidiary EADS Astrium-SAS (previously known as Matra Marconi Space France).

Alcatel Alenia Space is a leader in the global satellite industry. This company competes with EADS Astrium for the fourth and fifth positions in the global market behind the American manufacturers Boeing, Loral and Lockheed-Martin. Alcatel Alenia Space has a total of 6,500 employees (4,260 in France and 2,240 in Italy) and achieved revenues of € 1,5 billion in 2005. Alcatel Alenia Space is present in the military market via several program, such as Syracuse 2I (development of the whole satellite), Hélios 2, Pléiades (development of the optical instrument), or SAR-Lupe (contribution to the radar payload in the German satellite observation program).

EADS Astrium had 6,200 employees (2,300 in France, 3,900 in Europe) at the end of 2005 and achieved consolidated revenues of € 1,6 billion. EADS Astrium is established in Germany, the United Kingdom, Spain and France. In the Defence business, EADS Astrium mostly works on three program: Hélios 2, Pléiades (prime contractor) and Skynet V (manufacture of the satellites and ground segment). The company has also been involved in a number of Space demonstrator projects (Lola, Spirale and Elisa).

Based in Germany, the OHB Technology company has been appointed prime contractor for the German military radar satellite SAR-Lupe. OHB mainly works in the engineering sector for institutional customers.

Finally, in the United Kingdom, SSTL works closely with the University of Surrey Space Centre in the field of micro and minisatellites (under 500 kilograms), mainly for institutional customers. In particular, SSTL has contributed to the implementation of the test bed for the Galileo system.

In 2005, **ArianeSpace** has had very dense operational activities, with the launch of five Ariane 5s from French Guiana's Space Centre, and the launch, by Starsem, of three Soyuzs from the Baikonour Cosmodrome. These eight launchings have indeed enabled to put eleven satellites into orbit, i.e. more than half of the world satellites. ArianeSpace reasserts its international dominance and strengthens its role of major industrial player in European Space program. Its revenues in 2005 exceeded € 1 billion. ArianeSpace's position on the market of heavy telecommunication satellite launching has been strengthened by the putting into orbit, by Ariane 5, of Thaïcom 4 and Spaceway 2, the two biggest commercial satellites ever launched.

France, the leading institutional contributor in Europe, holds the industrial leadership in the sector in terms of satellites, but also of launchers, with 39% of the jobs and the key role of project and technology manager.

Future perspectives of the European Space industry

For several years, the revenues of the European Space industry have been evenly divided between institutional clients (ESA, national Space agencies, EU, military contracts) and commercial customers (telecommunications operators and ArianeSpace commercial launches). Since 2002, the geostationary telecommunication satellites sector, which dominates the commercial market in terms of both the manufacture of the satellites and their launch, has been marked by the **general crisis experienced by the telecommunications industry** in the past few years. This sector has also been affected by the failure of new constellation projects and the operators' consolidation, which has resulted in the reduction of excess orbital capacity and a boosted competition on the global market.

In this difficult environment, made worse for the European manufacturers by a euro/dollar exchange rate that is detrimental to their competitiveness, the European institutional market represented about 60% of the industry's total revenues in 2005. The institutional revenues have been relatively stable since 2002 (around € 2,7 billion), in spite of a number of interesting developments (Space program and demonstrators ordered by the Ministry of Defence, Pléiades, Galileo, GMES, etc.). **However, this dynamic institutional market will not be sufficient to generate by itself a recovery in the satellite-manufacturing sector, which has an over-capacity in production.**

Faced with this situation, EADS, which reduced its workforce of about 25% between 2002 and 2005, will continue its streamlining efforts in the Space area. In mid-2003, EADS pooled all its Space activities (for each country), under EADS Space's aegis, in three subsidiaries: EADS Space Transportation (launchers and Space infrastructures), EADS Astrium (satellites) and EADS Services. Today, a second reorganization is planned. It will pool the assets relating to launchers (former ST) and satellites (former Astrium) within a single company in each country. **This reorganisation confirms the fact that a merger between Astrium and Alcatel Alenia** Space, which was suggested by EADS when Alcatel and Thales merged part of their activities (see below), **is no longer on the agenda.**

Alcatel has recently announced that it is willing to integrate Alcatel Alenia Space into Thales, as an independent division, which will enable to streamline Alcatel Alenia Space and Thales' activities in the area of Space telecommunications ground segments, and to provide exhaustive solutions in terms of eavesdropping satellites.

As regards launchers, the efforts made by the entire European industry in order to boost the availability of and industrialize Ariane 5, together with the smooth implementation of Soyuz at the Guyanese Space Centre, are bearing fruit on the market. Moreover, the decisions taken by the ESA council, which gathered at the ministerial level on 5 and 6 December 2005, have reasserted the member states' support for Europe's Space access, a strategic target. These decisions have also confirmed the use of European launchers (Ariane 5, Soyouz, Vega) for European institutional missions. These initiatives clearly define Europe's firm commitment to support its industry of launchers.

THEME 4

▹ Defence in French Guiana

The Armed Forces and the protection of the Kourou launching site

Units from all of the French services (Army, Air Force, Navy, Gendarmerie) ensure the security of French Guiana's Space Center (CSG). The CSG, where some 1,500 people work, stretches out on more than 900 square kilometers, that is nearly Martinique's area. Its protection thus requires a permanent security system, which is significantly strengthened whenever there are launchings in order to cope with certain threats. Threats encountered by the CSG may be linked to industrial espionage or to malevolent actions against the site or its infrastructures that may be of terrorist nature.

The mission of the Armed Forces is detailed in a specific protection plan (PSP), implemented by the Senior Commander of the Armed Forces in French Guiana (COMSUP). The COMSUP reports directly to the Chief of the Defence Staff (CEMA) and mostly exerts operational responsibilities. The COMSUP has its own staff.

The Armed Forces are involved in four key areas, as far as the protection of Kourou site goes.

Land zone control

The main mission of the 3rd Foreign Infantry Battalion consists in ensuring the external protection of the CSG. The harsh vegetation (swamps, wild forest, savannah and mangroves) entails specific know-how and adequate equipment (such as Hägglunds BV 206 tracked vehicles).

Maritime Space control

The system set up by the Navy for the launching of Syracuse 3B is similar to what is implemented for every launching conducted by the European launcher ARIANE.
This system consists of:

- One Falcon 50 of the 24 F Flotilla, Lann-Bihoué base, in charge of evaluating surface situation of the fire zone.
- Two P400-class patrol boats, already based in French Guiana.
- A naval Gendarmerie VCSM-type patrol boat, also based in French Guiana.

The three surface ships are in charge of establishing a security perimeter around the fire zone, of conducting reconnaissance operations so as to detect suspect boats present in the zone and, if necessary, of intervening if such boats are within French territorial waters.

Air Defence and security

The Air Force, in collaboration with the Army, is responsible for the air security and the air Defence of French Guiana's Space Center (CSG), mostly within a No Flight Zone that stretches out beyond the 900-square kilometer site and a 6,500-meter altitude.
The air security and Defence system relies on:

- A detection radar in Kourou.
- Four SA330 Puma armed helicopters and three armed Fennecs, from the 68th French Overseas Guiana Helicopter Squadron.
- The air-Defence surface-to-air artillery of the 3rd Foreign Infantry Battalion, equipped with Mistral surface-to-air missiles and with five 20 mm guns.

Protection of the infrastructures and territorial security

The CSG's external security also requires the implementation of a specific protective system, to which the Gendarmerie significantly contributes.

A Mobile Gendarmerie Squadron, composed of 90 troops and set up at the Préfet's request, is in charge of this mission. The mission actually consists of collecting intelligence data throughout the whole surveillance zone, carrying out interventions in case of an intrusion in the site, and ensuring the infrastructures security.

Besides, for the most part, the overall territorial security is under the Gendarmerie's responsibility. The territorial brigade, the research brigade and the surveillance and intervention platoon are in charge of the missions pertaining to launchings. These units carry out missions of patrol, of public intelligence collection, of enhanced safety of sensitive spots and of convoy escorts, with Cayenne's motorized brigade, the Mobile Platoon Group (GPM), and the mobile Gendarmerie. Separately, two of Cayenne's GPM crews, with wheeled armored vehicles, are on the alert, so as to swiftly intervene to protect the CSG, if need be.

Lastly, a unit from the Paris Firemen Brigade (BSPP) also sees to the protection of all people and assets present in French Guiana's Space Center (CSG).

Missions of the Armed Forces in French Guiana (FAG)

As one of France's overseas territory in America, French Guiana is an ultraperipheral European region. It also is a French Département[13]. It stretches out on 91,000 square kilometres and has an Exclusive Economic Zone (EEZ) of about 130,000 square kilometers. This large territory has a population of 180,000 inhabitants, an uneven density of one inhabitant per square kilometer, and high levels of natural population growth and net immigration. This woody and landlocked territory also has common borders with Surinam and Brazil.

The peculiarity of French Guiana has, in many respects, a major influence on the missions of the Armed Forces (2,800 men) and on the way to fulfil them. There are four types of missions:

- The missions of the Armed forces in French Guiana are first and foremost carried out for **the Defence of French sovereignty** in their zone of responsibility:
  - The Armed Forces in French Guiana (FAG) ensure the Defence of the territory against potential external attacks and actively contribute to preserving a secured environment inside the borders of the territory.
  - In particular, they guarantee the external security of French Guiana's Space Center (CSG) in Kourou by way of the assets of the three services and the Gendarmerie (see document on this subject).
  - They also participate, along with the police, Customs and administrative departments, in the fight against illegal immigration and in the State's actions at sea (fishing surveillance and arrests of clandestine fishermen, fight against drug trafficking).
- The missions of **public service support** are twofold:
  - Fighting against all forms of illicit activities, in particular illicit gold washing and illicit immigration (intelligence, support to operations of the Gendarmerie and Criminal Investigation Department – operation Anaconda).
  - Participating in sea rescue operations and sanitary evacuations.
- The missions of participation in the **development of the Département:**
  - Les unités du service militaire adapté (SMA) réalisent des travaux au profit des collectivités et participent à l'insertion des jeunes par des formations professionnelles dans des secteurs économiques porteurs sur le plan local (bâtiment, transport, mécanique, etc.).
  - Les FAG apportent leur concours aux citoyens, collectivités locales et administrations dans des domaines aussi variés que les transports, la santé ou l'acheminement du courrier.

These missions are carried out within a **definitely joint**, and sometimes **interministerial, framework**, which brings together the Army, the Air force, the French Navy and the national Gendarmerie, as well as other State services present in the Département.

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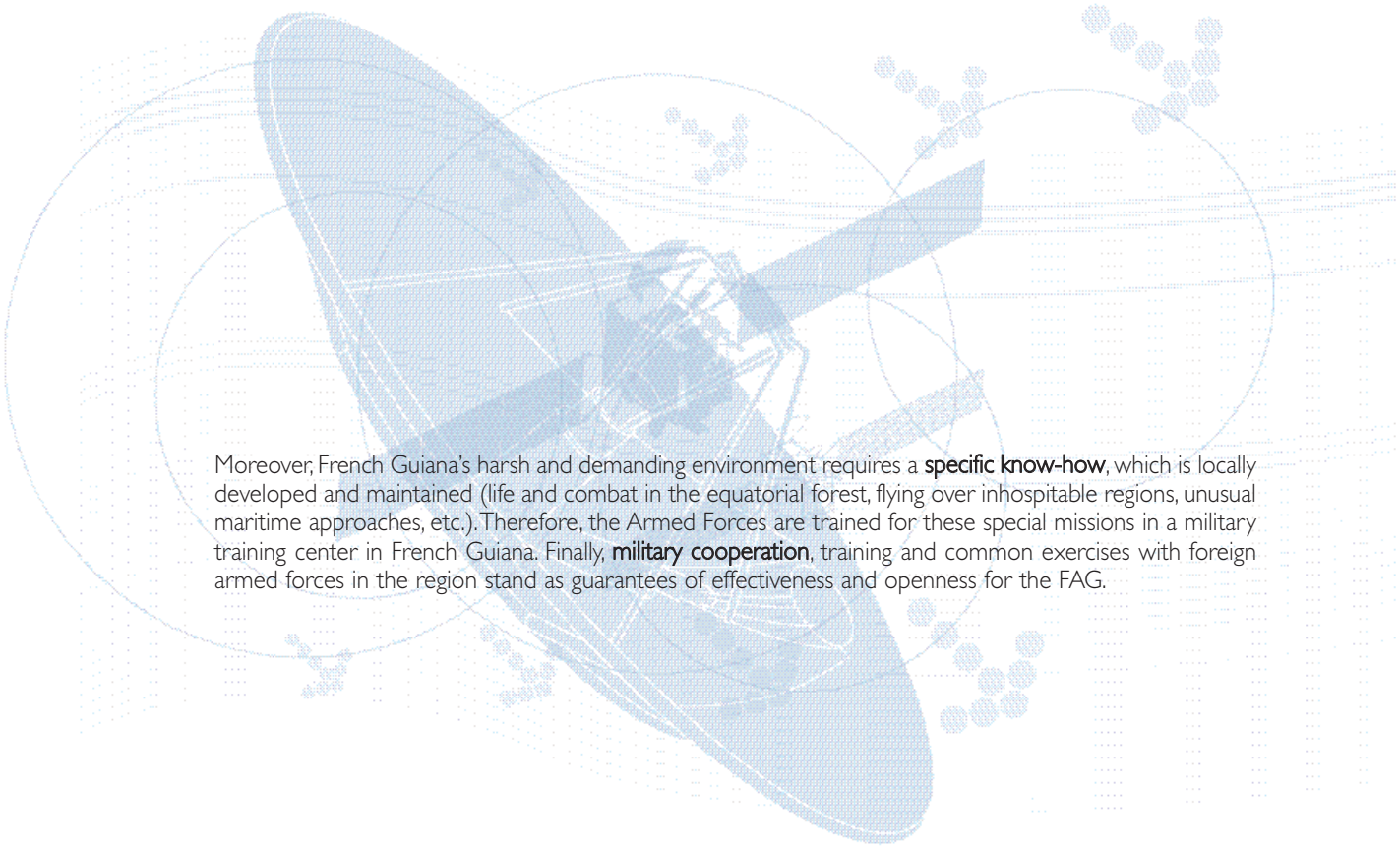
[13] *France is divided into 95 Metropolitan "départements" and 4 overseas "départements". Each has its own local authorities.*



Moreover, French Guiana's harsh and demanding environment requires a **specific know-how**, which is locally developed and maintained (life and combat in the equatorial forest, flying over inhospitable regions, unusual maritime approaches, etc.). Therefore, the Armed Forces are trained for these special missions in a military training center in French Guiana. Finally, **military cooperation**, training and common exercises with foreign armed forces in the region stand as guarantees of effectiveness and openness for the FAG.

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