

# ARCHIVED REPORT

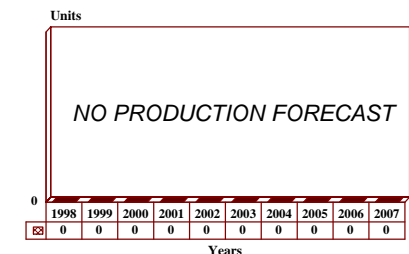
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## Syracuse 2 - Archived 2/99

### Outlook

- Satellite constellation completed in 1994
- INMILSAT cooperative effort scrapped
- Possibility still exists for France to form a satellite communications alliance with the US or others
- THIS REPORT WILL BE DROPPED IN 1999 BARRING INCREASED PROGRAM ACTIVITY

10 Year Unit Production Forecast  
1998-2007



### Orientation

**Description.** Satellite communications system tasked with the provision of worldwide C3I facilities to the French armed forces.

#### Sponsor

Delegation Generale pour l'Armement (DGA)  
 10/14 Rue Saint Dominique  
 F-75997 Paris Armees  
 France

#### Contractors

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Alcatel Transmission Fausceaux Hertiens  
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 France

#### MATRA SA

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 Portsmouth  
 Hampshire PO3 5PU  
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**Licensee.** No production licenses have been granted.

**Status.** In service.

**Total Produced.** The Syracuse 2 network includes three satellites and approximately 120 Rita-compatible ground stations. Further installations have been made on warships and airborne command posts. Up to 18 T-type and 20 TL-type terminals are identified as being in service with the French army.

**Application.** Used for encrypted C3 functions for the French Armed Forces.

**Price Range.** The unit cost of a Syracuse satellite was approximately US\$146 million (1988 US dollars).

## Technical Data

### Characteristics

Transponder frequencies: I/J band  
Power output: 40 W

**Design Features.** Under the original Telecom 1/Syracuse 1 agreement, the French government rented one-sixth of the capacity of the Telecom 1 satellite. Telecom 1A and 1B have geostationary orbit positions allocated to them at 8 degrees and 5 degrees west longitude, respectively. The military payload on these satellites is comprised of two 40 MHz repeater channels, two active 20 W TWTs (plus one spare) operating at 7-8 GHz in the SHF band, and two earth-coverage antennas. The region covered by these satellites ranges from the West Indies to the Reunion Islands. The satellites each emit two beacon signals to allow ground terminals to acquire and track them.

The Syracuse network ground segment includes fixed stations, transportable ground-based terminals and shipboard terminals. Naval installations use two 1.5 meter diameter, three-axis stabilized antennas. The naval satcom hardware, which includes a 1.5 kW klystron amplifier, is housed in a small shelter on the ship's bridge with the operator controls located in the communications room. The fixed ground stations deployed in metropolitan France serve both communications and network control functions. These units utilize 8 meter diameter dishes.

Two separate types of ground-based terminals, T-type and TL-type, are in use. The T-type units are installed in shelters carried by Renault TRM-10000 or ACMAT vehicles and operate using 2.7 meter diameter antenna dishes and a 1.5 kW klystron amplifier to provide up to 12

simultaneous duplex channels. The TL-type terminals are installed in shelters onboard Renault TRM-2000 or ACMAT VLRA vehicles and employ 1.4 meter diameter dishes and a 150 W TWT amplifier to provide up to 4 channels. This version is transportable by Transall-type aircraft. In addition, a new lightweight terminal designated Syter II has been designed. This can be carried by small all-terrain vehicles, uses a 90 cm deployable antenna dish, and has a power of 10 W.

Secure telex and data traffic is handled via 75 bit/sec and 2,400 bit/sec modems at each terminal. Telephone links use either a 2,400 bit/sec crypto vocoder or delta-mode 16 kbit/sec digitized voice circuits. Spread spectrum techniques are used to provide high resistance to jamming and to enable multiple access to the network.

**Operational Characteristics.** A primary role of the Syracuse system is to provide communications links between deployed warships and naval authorities on land. Links between national authorities, and both French forces deployed outside French territory and military authorities in French overseas possessions are also included. Syracuse also provides a redundant, space-based system to the national infrastructure network and battlefield communications systems.

## Variants/Upgrades

A 1989 contract awarded to Alcatel included provision for upgrading Syracuse 1 ground stations to the Syracuse 2 standard.

The anticipated life of a communications satellite of the Syracuse 1-2 technology maturity level can be expected to be approximately seven years. Speaking at the official inauguration of the Syracuse 2 system in November 1991, French Defense Minister Pierre Joxe confirmed Forecast

International's previous assessment that a new satellite system would start development during 1994-95 in order to support a launch in 1998. He also confirmed that the investment required for this program would preclude it from being a French-only system and that a collaborative European venture would be essential. This program was subsequently designated EuMilSatCom, which then became FMSCS. Full details of this program are included in the report SKYNET 4.

## Program Review

**Background.** In 1980 senior officials from the Ministries of Defense and Telecommunications signed an agreement on the joint use of the Telecom 1 satellite system. The document provided for the installation of two 7-8 GHz

repeaters for the exclusive use of the Ministry of Defense. This military payload formed the heart of the Syracuse 1 network.

The Telecom 1 satellites were scheduled to come to the end of their operational lives in 1992. Consequently, a number of possible solutions to the requirement to establish a replacement program, Syracuse 2, were evaluated. Although the combination civil/military Telecom 1 solution had performed successfully, the anticipated rise in military utilization made the adoption of a dedicated military communications satellite appear inevitable. The solution finally adopted, however, was for the French armed forces to lease 50 percent of the capacity of the new Telecom 2 satellites. Telecom 2 has double the capacity of the earlier Telecom 1, effectively giving the French Armed Forces their dedicated satellite system. During 1988 Matra was awarded a US\$440 million contract for three Telecom 2 satellites plus an option for a fourth.

With the 1989 award of a US\$632 million contract to Alcatel for the construction of Syracuse 2 ground systems, all components of the Syracuse 2 system were contracted for development. This contract ensured continuity in service of the first-generation system by increasing capacity, mobility and protection. The program was scheduled to span a six year period.

The Syracuse 2 system was inaugurated in November 1991 when French Defense Minister, Pierre Joxe, used the system's capabilities to send an encrypted message from the ground station in Carcassone to the nuclear-powered attack submarine *FS Amethyste* via the existing Telecom-1 satellite. The Telecom-2A satellite for the system was launched in December 1991 with Telecom-2B following in May 1992.

In December 1991, the UK, France, Germany, Italy and the Netherlands initiated a one-year cost and feasibility study for the development of a joint European military satellite communications system. Spain was also invited to attend this meeting. The program is structured to provide a follow-on to Skynet 4 and Syracuse with the first launch tentatively scheduled for 2005. Workshare and funding details remain classified.

Supporters of the program pointed out that if the countries were to act independently, they would require a total of ten satellites while a joint program would reduce the total to six. This program was subsequently designated the Future Military Satellite Communications System (FMSCS).

In recognition of the fact that the UK and France were the only countries in the initial working group with experience

in designing military communications satellites, FMSCS had been initiated as a bilateral Anglo-French program under the designation BIMILSAT. Since the earlier French Syracuse 2 system was a joint military/civilian satellite, the new BIMILSAT was to draw heavily on Skynet 4 rather than Syracuse. BIMILSAT was to be designated Skynet 5 in the UK and Syracuse 3 in France, the only differences being superficial changes to meet the communications requirements of the users.

Initial studies were concluded in 1995. At that point, the remaining three members of the group were given the opportunity to decide whether they wish to join with BIMILSAT (that later evolved into the ill-fated INMILSAT which included the US) or adopt a low-cost option of using military transponders on civilian satellites.

In 1996, the US, France and the UK decided to scrap the INMILSAT program because the three participants could not agree on the technology to be pursued for the satellites, who would be responsible for the funding, or whether to share existing technology with the others. Ultimately, in late 1995 it was clear that no agreement would be reached. France had set a year-end deadline to reach an agreement with the US and the UK (a move that was seen as a pressure tactic) though the reason for the deadline was to insure that French government would have enough time to decide how much funding to allocate to the program.

The main issue standing in the way of the INMILSAT program was the inequality of technology among the three participants. France's Syracuse 2 communications system does not have extremely high frequency (EHF) capability - a feature that was to be a major requirement of the INMILSAT program. Marc Esteve of the Missiles and Space Division of the Defense Attache for the French embassy, said in an article in *Inside the Air Force*, "The number of military satellites in France and Great Britain are relatively few compared to the US which has more integration problems to work through before new systems are built."

In early 1996, the US Department of Defense officially declared INMILSAT a dead program, but the French are still actively trying to initiate a cooperative program with the US, the UK, or other European countries that may have an interest in sharing satellite communications technology.

## Funding

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Funding for Syracuse 2 was planned to total US\$1.072 billion. Of this, US\$440.4 million for the three satellites was committed during 1988. The balance of the allocated funds went to install ground installations. A US\$632-million contract covering these was awarded in 1989.

## Recent Contracts

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No recent (1994+) contracts have been awarded for Syracuse 2 or any known derivative

## Timetable

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	1980	Syracuse 1/Telecom 1 agreement
	1983	Syracuse 1/Telecom 1 trials
	1984	Telecom 1 satellite launched
	1985	Delivery of ground systems started
	1987	Telecom 1 network completed
	1988	Additional satellite launched
		Syracuse 2 satellite development contract placed
Mar	1989	Syracuse 2 ground facilities development contract placed
Nov	1991	Syracuse 2 system inaugurated
Dec		First Syracuse 2 satellite launched
	1992	Telecom 1 satellite reached end of operational life
May		Second Syracuse 2 satellite launched
	1994	Third Syracuse 2 satellite launched

## Worldwide Distribution

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**France** (3 satellites orbited by 1994)

## Forecast Rationale

The worldwide deployment of French military forces makes the provision of comprehensive command/control facilities essential. The use of relatively secure satellite communications for this purpose is an inevitable outcome of this basic requirement. With the French Ministry of Defense being assigned to providing this capability, France made a financial commitment exceeding US\$1 billion to Syracuse 2 at a time when many other defense programs were being downsized. France also indicated intent to play a significant role in future military activities across the globe.

Comparison between the Syracuse 2 and Skynet 4 programs is instructive. The joint military/civilian use of communications satellites has often been presented as a valuable option for reducing operational costs to both sectors. The dedicated military Skynet system costs approximately half the joint-use Syracuse. Thus, not only does the joint-use concept not result in financial savings, but adopting a dedicated military satellite means that the advantages stemming from that policy effectively can be realized.

It has become apparent that Syracuse 2 is at a technical disadvantage in being able to protect its payload against physical and electronic attack. Sharing the responsibility of one satellite between military and civilian applications

may make both systems unnecessarily vulnerable in time of war. Although the system will continue to be developed throughout the 1990s and ground terminals, both shipboard and land-based, acquired, the future appears to lie with dedicated military communications satellites.

Even given the difficulty of trying to reach an agreement with the US and the UK on the INMILSAT program, it is probable that the French are willing to try again to enter into a communications satellite collaboration. France and the US have begun negotiations that may lead to the transfer of EHF technology by 2005, the year a new-generation Syracuse system is expected to become operational. It is believed that France would like to reach an agreement with the US in the next year (1999).

Recognition that the individual national budgets of even highly nationalistic countries such as France cannot “go it alone” has resulted in current investigations to determine the feasibility of, and interest in, the cooperative European development of the HELIOS II and OSIRIS reconnaissance satellites. This spirit of cooperation has the potential to spill over into the communications arena as well.

Europe is fast becoming a major hub of satcom hardware and systems development. Currently, both France and the

UK have established satellite communications systems, and their progress has been followed closely by Germany, Italy and others - countries that are in the planning and development stages of such programs.

The Syracuse 2 satellite program ended in 1994 with the completion of the last Syracuse package for the Telecom 2C satellite.

Syracuse 3, the successor to the Syracuse 2 project, is currently covered in the report on Skynet 4 because of its purely military application. Exports of the Syracuse satellite system are not likely as satellite communications technology has advanced well beyond the capabilities of this system. It is possible that elements of the ground communications systems developed in the Syracuse program will be exported for use with different satellites.

## Ten-Year Outlook

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No further production is forecast.

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