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**Towards Europe-wide systems and services -**

**Green Paper on a common approach in the field of  
satellite communications in the European Community**

**Communication from the Commission**

## SHORT PRESENTATION

Satellite communications have developed dramatically during recent years. As the European Community approaches the Europe-wide market of 1992, satellite communications are becoming a vital element for the trans-European services and networks needed for the single European market, and the broader continental dimension which is developing from the revolutionary changes in Eastern Europe.

Since satellite communications represent by far the largest commercial application for satellite technology, they will determine, to a large extent, the commercial success of Europe's effort to gain a strategic and future-proof position in space. They have developed into an essential element of the common European audio-visual space, which is a central precondition for Europe's future political and cultural identity and coherence.

This Communication is being written at a time when the European Community is about to achieve its aim of completing the internal market by 1992. Satellite communications can make an important contribution to this process, given the appropriate regulatory and market developments.

In the field of satellite communications the challenge is particularly great. The Community's internal market is still highly compartmentalized. This may, if no changes are brought about, hamper the development of its satellite industry, which is still in its infancy in service terms - despite its advanced position in technological terms. This compartmentalisation has not allowed the appropriate use of the potential of the new satellite communications technologies for the provision of Europe-wide systems and services.

The need for change is therefore undeniable. The compartmentalisation of the Community's satellite communications market cannot be maintained in view of 1992.

Abolishing these restrictions is not only in the interest of users, service providers and equipment manufacturers, but also in the interest of the Member States themselves. The Commission's move for liberalisation in the field of terrestrial telecommunications, based on the Green Paper for the development of a common market for telecommunications services and equipment, was supported by all Member States, since they were convinced that they would otherwise forego the potential growth of this market, the business opportunities for their industry and the supply of their users with advanced telecommunications services.

In the field of satellite communications, the same considerations apply.

Furthermore, the recent changes in Eastern Europe define a range of applications which may prove particularly suited to satellite technology. Only with a lifting of restrictive national regulations within the Community, thereby allowing the implementation of Europe-wide satellite terminal networks, can the European Community play a full role in meeting the emerging satellite communications needs of its Eastern neighbours. Otherwise Central and Eastern Europe's satellite technology and equipment needs are likely to be met by suppliers from third countries, who can build on the existence of major satellite terminal networks already implemented in their home countries due to their more liberal regulatory regime.

Several Member States have already liberalised parts of their satellite communications sector on their own initiative. In particular, some Member States have authorised a number of operators to provide satellite services across borders towards other Member States. This raises a number of questions with regard to fundamental principles of the Treaty of Rome such as the free circulation of goods and services. It is important that these questions be resolved at Community level so that divergent national solutions are avoided.

The objective of this communication is to prevent such a divergent situation by proposing a future-oriented structure for the development of satellite communications for the Single Market of 1992.

The paper intends to extend the application of the general agreed principles of Community telecommunications policy to satellite communications, taking into account the specificities of this means of communication. Four major changes are proposed:

- *Full liberalisation of the earth segment, including both receive-only and transmit/receive terminals*, subject to appropriate type approval and licensing procedures where justified to implement necessary regulatory safeguards;
- *Free (unrestricted) access to space segment capacity*, subject to licensing procedures in order to safeguard those exclusive or special rights and regulatory provisions set up by Member States in conformity with Community law and based on the consensus achieved in Community telecommunications policy.

Access should be on an equitable, non-discriminatory and cost-oriented basis.

- *Full commercial freedom for space segment providers, including direct marketing of satellite capacity to service providers and users*, subject to compliance with the licensing procedures mentioned above and in conformity with Community law, in particular competition rules.
- *Harmonisation measures as far as required to facilitate the provision of Europe-wide services*. This concerns in particular the mutual recognition of licensing and type approval procedures, frequency coordination and coordination with regard to Third Country providers.

With the combination of these changes, a broad range of specialised services will become possible.

It is intended to proceed in the following manner:

- This Communication should lead to a debate in the Council, the European Parliament and the Economic and Social Committee and among all those concerned within the Community - the telecommunications and broadcasting sector, telecommunications and space industry, the trade unions, and in particular the many new users and service providers, such as education and training institutions - on the use that should be made of satellite communications, on the need for further development of satellite services and on the necessary regulatory framework to fulfil these requirements;
- After an appropriate consultation period, the Commission will present its conclusions to the Council on the implementation of a Community policy for satellite communications including the necessary regulatory instruments.

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## I. INTRODUCTION

The working out of a coherent European position regarding the future regulation and development of satellite communications in the European Community was singled out as a priority in the 1987 Green Paper on the development of the common market for telecommunications services and equipment and the subsequent implementation action plan.<sup>1,2</sup>

In its Resolution of 30 June 1988<sup>3</sup> adopting the general principles of the Green Paper, the Council considered as a policy goal in telecommunications the "working out of a common position on satellite communications, so that this new information medium can develop in a favourable environment, taking account of the general rules of operation and exploitation of the network environment, as well as the competition rules of the Treaty and existing international commitments of the Member States".

It is the intention of this paper to follow up this objective.

The major part of the current regulatory and organisational structure of satellite communications in Europe was created more than a decade ago. In the meantime, dramatic technological advances have opened completely new avenues of use which go far beyond the role of satellites in public voice telephone transmission between Telecommunications Organisations for which this structure was originally principally designed. Television via satellites to cable TV head-ends and, more recently, directly to businesses and homes has developed into a major application of satellites in Europe. The development of small dishes of only 0.5 - 2.5 meters diameter for a variety of user applications - compared to up to about 30 meters for the traditional earth stations for trunk telephony and TV programme interchange use - have opened completely new opportunities for rapid development of Europe-wide systems by service providers - both public and private - tailored to very specific needs of individual customer groups.

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<sup>1</sup> Towards a Dynamic Economy - Green Paper on the development of the Common Market for telecommunications services and equipment, COM(87) 290, 30/06/1987.

<sup>2</sup> Towards a competitive Community-wide telecommunications market in 1992 - Implementing the Green Paper on the development of the Common Market for telecommunications services and equipment, COM(88) 48, 09/02/1988.

<sup>3</sup> Council Resolution of 30 June 1988 on the development of the Common Market for telecommunications services and equipment up to 1992, O.J. C 257, 04/10/1988, p. 1.

As a consequence, besides the traditional "point-to-point" applications of satellite communications developed by the Telecommunications Organisations to provide international and long-distance links in the context of the international organisations originally set up for this purpose - INTELSAT, INMARSAT, EUTELSAT - completely new applications have led to the development of new distinct markets, such as "point-to-multipoint" one-way and interactive two-way Very Small Aperture Terminal (VSAT) systems. These range from a few dozen up to several thousand terminals, and have the potential to become a vital component of Europe-wide business communications. Other applications include satellite news gathering (SNG) systems - the collection of news and data from multiple points - these are becoming important in the context of Europe-wide information and broadcasting activities, and direct-to-home satellite television.

In parallel, the number of satellite systems in place - on an international, national and to some extent private basis - is multiplying in Europe, corresponding to the new diversity of use which goes far beyond the past vision of satellite communications as an additional transmission system between national telephone systems.

However, the new services and markets can only become a reality in Europe, if the current regulatory restrictions - originally designed for another context and for other purposes - are carefully reviewed.

A number of Member States have recognised the basic change in market conditions brought about by the multiplication of possible uses and have started to review the regulatory conditions of the sector on their own initiative, abolishing restrictions of use liable to prevent the full development of the new services and systems.

Satellite communications were set aside for later consideration in the Green Paper on the development of the common market for telecommunications services and equipment. The consensus achieved, on the basis of this Green Paper and the subsequent political decisions, in particular at the Telecommunications Council on 7 December 1989 on the general future regulatory conditions of the telecommunications sector in the European Community, can now be the basis on which to build a common regulatory position in the field of satellite communications. Such a common regulatory position on satellite communications, while safeguarding the exclusive or special rights of Telecommunications Organisations allocated by Member States in conformity with Community law and the directives on competition in the markets for telecommunications terminal equipment and services,<sup>4,5</sup> must take proper account of the requirement to use the *full* potential of satellite

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<sup>4</sup> Commission Directive of 16 May 1988 on competition in the markets in telecommunications terminal equipment (88/301/EEC), O.J. L 131, 27/05/1988, p. 73.

<sup>5</sup> Commission Directive of 28 June 1990 on competition in the markets for telecommunications services

communications for the development of Europe-wide services with a view to the 1992 single market and the continental dimension introduced by the developments in Central and Eastern Europe. It must recognise the need to abolish those restrictions which prevent such new activities and create a framework which promotes them, as well as the need to support Europe's position in space and the objectives of Community audio-visual policy.<sup>6</sup>

A first step towards allowing full use of the potential of satellite communications was taken with the abolition of exclusive and special rights on the importation, marketing, connection, bringing into service and/or maintenance of receive-only satellite earth stations not connected to the public network, in the context of the liberalisation of the Community's terminal equipment sector<sup>7</sup>. It now seems timely to extend the application of the agreed general principles of Community telecommunications policy to satellite communications:

- liberalisation of use, while allowing for the implementation of regulatory safeguards through appropriate type approval and licensing schemes, as compatible with Community law and, in particular, competition rules;
- separation of regulatory and operational functions, in order to avoid conflicts of interest;
- implementation of harmonisation measures, as far as required for ensuring effective working of Europe-wide services and equipment markets.

Based on these considerations, a phased approach is proposed in chapter VI., in order to achieve a consistent Community policy on satellite communications:

1. Agreeing on basic proposed positions, which apply the general principles set out above to the satellite communications sector;
2. Initiating a number of measures at Community level which, based on the proposed positions, aim at allowing effective Europe-wide provision and use of services;

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90/388/EEC, O.J. L 192, 24.07.1990, p. 10.

<sup>6</sup> Communication by the Commission to the Council and to the European Parliament on audio-visual policy, COM(90) 78, 21/02/1990.

<sup>7</sup> Commission Directive of 16 May 1988 on competition in the markets in telecommunications terminal equipment (88/301/EEC), O.J. L 131, 27/05/1988.

3. Launching a number of lines of action, in order to create a favourable environment for such operations, in particular with regard to the international commitments of Member States in this area, and concerning standardisation and the promotion of the full use of satellite technologies to the best advantage of Europe's communication system.

## II. The Satellite Scene in Europe

### 1. The General Environment

Telecommunications satellites were originally conceived for the establishment and enhancement of international communications, and this is still their main application. Even where satellites are used for *national* services, since satellite beams cannot be shaped to follow national boundaries exactly, the regulation of satellite communications, and the co-ordination of frequencies used by these satellites, are issues going beyond the purview of national legislative or administrative systems.

Frequency bands for satellite services are allocated by World Administrative Radio Conferences (WARC's) and Regional Administrative Radio Conferences (RARC's). Use of frequencies within these bands is co-ordinated and administered by the International Frequency Registration Board, a body of the International Telecommunications Union (ITU), both internationally and with regard to the Member States of the Community. For the purposes of frequency allocation at WARC's and RARC's, civil satellite services are mainly divided into fixed, mobile, broadcasting and radiodetermination services. At the time when this division was made, it reflected the fact that the different services were provided by different organisations: fixed services by telecommunications organisations, mobile services by international consortia, and broadcast services by broadcasting authorities (though often through earth stations operated by telecommunications organisations).

Historically, the Radio Regulations of the International Telecommunications Union provide definitions of these categories, which are called the Fixed-Satellite Services (FSS), the Broadcasting-Satellite Services (BSS), the Mobile-Satellite Services (MSS), and the Radiodetermination-Satellite Services (RDSS) (see Glossary). However, with current rapid technological development, these originally clear distinctions are becoming more and more blurred, for example between Fixed Satellite Services and Broadcast Satellite Services and between Mobile Satellite Services and Radio Determination Satellite Services (see chapter III.).

The general development of satellite communications at the international level has been characterised by the establishment of INTELSAT - the International Telecommunications Satellite Organisation ; INMARSAT - the International Maritime Satellite Organisation ; and the European Telecommunications Satellite Organisation, EUTELSAT.

### 1.1 INTELSAT and INMARSAT

INTELSAT, the International Telecommunications Satellite Organisation, was established in 1964 by 11 countries; it now has 119 members and provides international telephony, data and video (point-to-point) services as well as in certain cases, television broadcast services in the fixed satellite service (FSS) frequency band. INTELSAT's governing charter is a 1973 intergovernmental convention known as the INTELSAT Agreement signed by the member governments of the organisation. This is supplemented by an Operating Agreement, signed mostly by the telecommunications organisations of the member countries as appointed by the national governments<sup>8</sup>.

The INTELSAT Agreement, inter alia, binds national governments which sign it, not to establish, acquire or utilise other satellite systems without (a) performing "technical co-ordination" with the INTELSAT system to avoid mutual interference, and (b) proving that the separate system and services will not cause "economic harm" to INTELSAT (the so-called Article XIV procedure). The second proviso aims at limiting competition from separate systems and services which are considered by INTELSAT a potential threat to its revenues.

INTELSAT's turnover in 1989 was 480 million ECU.

All Member States of the Community are members of INTELSAT. The ownership share of Community Member States in INTELSAT was 28.2 % as at 1 March 1990.

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<sup>8</sup> Some members have created special organisations for representing them as signatories to the international satellite organisations : the United States has created COMSAT ; Italy has created TELESPAZIO.

The only Eastern European members, Yugoslavia and Romania have 0.20% and 0.05 % respectively and other European countries account for a further 3.4 %. As far as provision of the actual satellites for the system is concerned, European manufacturers have never succeeded in becoming the prime contractor for any INTELSAT satellite series, although European companies have been involved as subcontractors to US manufacturers, notably in the INTELSAT VII series now being developed.

INMARSAT, the International Maritime Satellite Organisation, was established in 1979 by an intergovernmental Agreement; it now has 61 Member States. Operations are carried out by the designated signatories (the telecommunications organisations<sup>9</sup>) of the member states. Modifications to the original INMARSAT convention allow it to operate land mobile and aeronautical mobile services in addition to maritime mobile services, all using the Mobile-Satellite Services (MSS) frequency band around 1.5 - 1.6. GHz, the so called L-band.

INMARSAT's turnover in 1989 was 98.4 million ECU.

With the exception of Ireland and Luxembourg, all Member States of the Community are members of INMARSAT. European states have made a major contribution to the development of this service - almost 52 % of the shareholdings in INMARSAT are held by authorities of European states. The Community Member States investment shares total about 34 percent. MARECS satellites, developed in cooperation with European industry by the European Space Agency (ESA), are currently used by INMARSAT (one as a prime satellite for the Atlantic Ocean Region, a second as a back-up in the Pacific). In addition, British Aerospace heads the consortium constructing the INMARSAT second generation satellites, scheduled to come into operation in 1990. The overall European industrial content of this contract is some 60 percent. INMARSAT has issued its Request for Tenders to industry for the third generation of satellites at the beginning of October 1989, calling for availability of these satellites in 1993.

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<sup>9</sup> see 8)

## 1.2 EUTELSAT

EUTELSAT, the European Telecommunications Satellite Organisation, is an intergovernmental organisation with members from 28 European countries, including all member countries of the European Conference of Postal and Telecommunications Administrations, the CEPT. Recently, Poland and Romania have become members ; discussions are continuing with other Eastern European countries.

EUTELSAT provides and operates telecommunications satellites for telephony, data and video services within Europe, in the Fixed-Satellite-Service (FSS) frequency band. The EUTELSAT system has undergone the co-ordination process outlined above, *i.e.* it has proven that it will not cause significant economic harm to INTELSAT. In addition, Article XVI of the EUTELSAT convention foresees technical co-ordination and "economic harm" co-ordination similar to Article XIV of the INTELSAT convention for satellite systems offering services in Europe.

While the original rationale for EUTELSAT was the provision of international telephony within Europe, the take-up of this service has proved slow, initially due to the extensive terrestrial microwave networks, and latterly because of the growing availability of fibre optic cable. On the other hand, a considerable market has developed for television distribution using the FSS frequency band rather than frequencies designated for broadcasting. EUTELSAT now derives nearly 75% of its revenues from television distribution.

The members of EUTELSAT are mostly the national Telecommunications Organisations<sup>10</sup> which have been designated generally by the member states as signatories to the Operating Agreement. Under the terms of this Agreement, it can only rent space segment to its signatories. With the exception of the European Broadcasting Union (EBU), other organisations wishing to set up a satellite service using EUTELSAT space segment are obliged to purchase it from their national signatory.

EUTELSAT's turnover in 1989 was 100 MECUs.

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<sup>10</sup> For some smaller non-EC countries, the Governments are signatories such as Monaco, Vatican City, Lichtenstein, San Marino, and Malta. See Footnote 8. concerning Italy.

All Member States of the Community are members of EUTELSAT. The EC Member States have an investment share totalling 88.0 percent. EUTELSAT's other 15 signatories control the remaining 12.0 percent of the investment share. As in the other two organisations, each year the investment share per signatory is calculated on the basis of their percentage of traffic carried over the satellites. The satellites for the EUTELSAT second generation are currently being developed by a European consortium, under prime contractorship of Aerospatiale. The first of these satellites has been launched successfully in August 1990.

An overview of European investment shares and Community signatories to the agreements is given in Fig. 1.

Figure 1

### Shareholding of Community Member States and Community Signatories in INTELSAT, INMARSAT, and EUTELSAT

ORGANISATION	INTELSAT		INMARSAT		EUTELSAT	
	MEMBER STATES	SIGNATORY <sup>1</sup>	IN-VEST-MENT	SIGNATORY <sup>1</sup>	IN-VEST-MENT	SIGNATORY <sup>1</sup>
BELGIUM	REGIE DES TELEGRAPHES ET TELEPHONES (RTT)	0.66	REGIE DES TELEGRAPHES ET TELEPHONES (RTT)	0.74	REGIE DES TELEGRAPHES ET TELEPHONES (RTT)	3.54
DENMARK	GENERALDIREKTORATET <sup>2</sup> FOR POST-OG TELEGRAFVAESNET	0.65	GENERALDIREKTORATET <sup>2</sup> FOR POST-OG TELEGRAEVSNET	2.55	GENERALDIREKTORATET <sup>2</sup> FOR POST-OG TELEGRAVAESNET	2.13
FRANCE	FRANCE TELECOM	4.41	FRANCE TELECOM	4.23	FRANCE TELECOM	13.36
GERMANY	DEUTSCHE BUNDESPOST TELEKOM	3.50	DEUTSCHE BUNDESPOST TELEKOM	2.43	DEUTSCHE BUNDESPOST TELEKOM	12.95
GREECE	HELLENIC TELE-COMMUNICATIONS ORGANISATION (OTE)	0.50	HELLENIC TELE-COMMUNICATIONS ORGANISATION (OTE)	2.93	HELLENIC TELE-COMMUNICATIONS ORGANISATION (OTE)	0.05
IRELAND <sup>3</sup>	TELECOM EIREANN	0.13	-	-	TELECOM EIREANN	0.05
ITALY	TELESPAZIO	2.10	TELESPAZIO	2.15	TELESPAZIO	8.29
LUXEMBOURG <sup>4</sup>	ADMINISTRATION DES P & T	0.05	-	-	ADMINISTRATION DES P & T	3.69
NETHERLANDS	PTT Nederland NV	1.14	PTT Nederland NV	2.55	PTT Nederland NV	3.84
PORTUGAL	COMPANHIA PORTUGUESA RADIO MARCONI	0.60	COMPANHIA PORTUGUESA RADIO MARCONI	0.27	COMPANHIA PORTUGUESA RADIO MARCONI	1.12
SPAIN	TELEFONICA	2.22	TELEFONICA	2.00	TELEFONICA	22.09
UNITED KINGDOM	BRITISH TELE-COMMUNICATIONS PLC <sup>5</sup>	12.24	BRITISH TELE-COMMUNICATIONS PLC <sup>5</sup>	13.81	BRITISH TELE-COMMUNICATIONS PLC <sup>5</sup>	16.90
TOTAL MEMBER STATES INVESTMENT SHARE		28.20 %		33.66 %		88.01 %

- <sup>1</sup> The Convention is an inter-governmental agreement. However, member states have designated the organisations indicated as signatories to the Operating Agreement on their behalf.
- <sup>2</sup> Telecom Denmark controls the availability of space segment capacity for telecommunications purposes.
- <sup>3</sup> Ireland is not a member of INMARSAT.
- <sup>4</sup> Luxembourg is not a member of INMARSAT.
- <sup>5</sup> A signatories affairs office has been created as a unit fully separated from British Telecom's business activities, in order to handle requests for satellite capacity.

The evolution of satellite communications in the Community has been deeply marked by the role of the telecommunications organisations as signatories to the international satellite agreements, the exclusive right of the EUTELSAT, INMARSAT, INTELSAT signatories to purchase and resell space segment capacity, the implication of the technical co-ordination and "economic harm" procedures foreseen in the agreements, and the natural tendency of the telecommunications organisations, in their role as signatories of EUTELSAT, INMARSAT, and INTELSAT, to utilise the space segment capacity of these organisations in the light of their national requirements.

## 2. The Development of Satellite Systems in Europe

With the exception of the use of the large international systems with European coverage such as the INTELSAT facilities, the use of satellite communications in Europe is a relatively new experience. Only since 1983 has Europe had its own first operational satellite, called ECS-1 or better known by its operational name EUTELSAT I-F1. At that time Europe had implemented 3 experimental satellite systems totalling 6 satellites of which 5 reached orbit. These were the Franco-German Symphony 1 and 2, Italy's SIRIO 1 and 2 and ESA's Orbital-Test-Satellite, OTS 2.

By 1983 the United States had considerably more experience, with development of some 25 experimental satellites since the end of the fifties. American industry had already built 150 operational telecommunications satellites for use all over the globe. After development of only six experimental satellites, Europe also decided to start building operational satellites to supply the growing European market. These first operational satellites were mainly intended for point-to-point telephony communications and the distribution of television signals around Europe. More than three quarters of the capacity of these satellites is now used for TV distribution purposes.

From an industry point of view, the space industry in Europe is catching up, albeit slowly. Having manufactured only 6 telecommunication satellites in the period 1980-1984, in the years 1985-1989 7 telecommunications satellites were produced and at present the European space industry has 17 orders with a total value of about 1 billion ECU for the period up to 1994.

Europe will have a large amount of satellite capacity available in the 1990s. All non-military European national, private and intra-European systems together will make available a total of 24 operational DBS (television) channels on the Broadcasting-Satellite Services (BSS) satellites in 1993. In the Fixed-Satellite Services (FSS) a total of around 380 European transponder equivalents<sup>11</sup> will be available in 1993 against about 170 transponder equivalents in 1990. Not included here are the international systems such as INTELSAT and INMARSAT, and non-European systems with European coverage, such as the U.S.-based PanAmSat and the (planned) ORION satellites and the USSR-based GORIZONT and RADUGA systems.

An overview of current existing and planned satellite systems with European coverage ("footprint") and their planned applications is given in Fig. 2 and 3.

Main applications are expected to be television distribution, telephony (mainly for extra-Community traffic), and new applications (see chapter III.). As mentioned, EUTELSAT is deriving nearly 75 % of revenues from television distribution. The traditional applications - long-distance trunk telephony and short-term high bandwidth requirements such as studio-to-studio television transmission - still account for a major, though declining, proportion of international satellite services. Satellite links still account for nearly 60 % of transAtlantic telephony, though this is expected to fall to 30 - 40 % by 1995 (see chapter III.). However, within Europe, satellite-carried voice telephony accounts for only 2 - 3 % of intra-European international and national long-distance calls.

As is shown by Figures 2 and 3, the European space segment has experienced substantial diversification during recent years, which may be expected to continue in the near future. In addition to the space segment provided by the international telecommunications satellite organisations which will continue to play a strong role and which currently provide a major part of the space segment currently accessible from Europe, a large number of new systems are entering the market, sponsored both by the national telecommunications organisations and by other private organisations.

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<sup>11</sup> Transponder capacity is taken equivalent to a channel of about 36 MHz. A single transponder can normally carry one television channel or up to about 1700 telephone voice channels.

Figure 2

### Current and Planned European Civil Satellite Systems

NAME	OWNING ORGANISATION	LAUNCH	MISSION	NOTE
EUTELSAT-1F1	EUTELSAT	1983	Telephony, television distribution, business communications, mobile communications	
EUTELSAT-1F2	EUTELSAT	1984	Telephony, television distribution, business communications, mobile communications	
TELECOM 1A	FRANCE TELECOM	1984	Telephony, television distribution, business communications, etc.	
EUTELSAT-1F4	EUTELSAT	1987	Telephony, television distribution, business communications	
EUTELSAT-1F5	EUTELSAT	1988	Telephony, television distribution, business communications	
ASTRA-1A	SES-ASTRA <sup>1</sup>	1988	Television distribution	
TELECOM 1C	FRANCE TELECOM	1988	Telephony, television distribution, business communications, etc.	
TDF1	FRANCE TELECOM	1988	DBS (television)	
TVSAT-2	Deutsche Bundespost TELEKOM	1989	DBS (television)	
TELE-X	SWEDISH SPACE CORPORATION	1989	DBS, small terminal networks data and telephony services	
MARCO-POLO-1	BSB <sup>2</sup>	1989	DBS, Data broadcasting	
DFS-1 KOPERNIKUS	Deutsche Bundespost TELEKOM	1989	Telephony, television distribution, data and business communications	
OLYMPUS <sup>3</sup>	ESA	1989	Experimental communications, DBS	
TDF2	FRANCE TELECOM	1990	DBS (television)	

Figure 2

NAME	OWNING ORGANISATION	LAUNCH	MISSION	NOTE
DFS-2	Deutsche Bundespost TELEKOM	1990	Telephony, television distribution, data and business communications	
MARCO-POLO-2	BSB	1990	DBS, Data broadcasting	planned
EUTELSAT II F1 to F6	EUTELSAT	1990 (F1) et seq	Telephony, television distribution, business communications, mobile communications	F2 to F6 planned
ITALSAT <sup>4</sup>	TELESPAZIO	1991	Telecommunications, data, and business communications	planned
ASTRA-1B	SES-ASTRA	1991	Television distribution	planned
TELECOM 2A	FRANCE TELECOM	1991	Telephony, television distribution, business communications, Security.	planned
TELECOM 2B	FRANCE TELECOM	1992	Telephony, television distribution, business communications, Security.	planned
LOCSTAR 1 and 2	LOCSTAR <sup>5</sup> Consortium	1992	Mobile communications and radiolocation	planned
HISPASAT 1 and 2	SPANISH AUTHORITIES/ Telefonica	1992-1993	TV distribution, DBS, data and business communications	planned
SARIT	RAI	1993	DBS	planned
ARTEMIS	ESA	1993	Experimental mobile communications, data relay	planned
ASTRA-1C	SES-ASTRA	1994	Television distribution	planned
EUROPE SAT F1 to F5	EUTELSAT	1995 et seq	DBS	planned
KEPLER	Deutsche Bundespost TELEKOM	1996	DBS, Business and data communications, TV distribution	planned

**Figure 2**

NAME	OWNING ORGANISATION	LAUNCH	MISSION	NOTE
ASTRA-2 Series	SES-ASTRA	....	DBS, small terminal systems, mobile	planned
DFS-3	Deutsche Bundespost TELEKOM	...	telecommunications and business communications	planned
EUTELSAT-III	EUTELSAT	1997 et seq.	telephony, television distribution, business communications, mobile communications	planned

Note : This list does not include a number of programmes which have been announced but for which launch dates are not known : ATLANTIC satellite (Hughes Communications / J. Stafford) ; VIDEOSAT (France Telecom) ; F-SAT (France Telecom) ; APEX (France Telecom). Nor does it contain highly elliptical orbit systems that are in early study phases (ARCHIMEDES / ESA, SYCOMORES / France)

- 1 SES shareholders include Luxembourg, Belgian, German, and Scandinavian banking and investment interests, and British television interests.
- 2 The BSB Consortium currently includes as major shareholders : Granada, Pearson, Bond Corporation, Chargeurs SA, Reed International.
- 3 Capacity used by BBC Enterprises, RAI, EUROSTEP Association, Telecommunications Administrations, Research Institutes, etc.
- 4 ITALSAT will use new frequency bands at Ka-band (20-30 GHz) to improve performance to small ground terminal systems and is a pre-operational system.
- 5 The Locstar consortium includes as shareholders CNES, MATRA, GEC-Marconi, Daimler-Benz, etc.

Figure 3

**Non-European satellites  
used for services with European coverage**

NAME	OWNING ORGANISATION	LAUNCH	MISSION	NOTE
INTELSAT v <sup>1</sup> Generation	INTELSAT	see notes	Telephony, television distribution, business and data services, (mobile leased by INMARSAT)	
INTELSAT VI <sup>2</sup> Generation	INTELSAT	see notes	Telephony, television distribution, business and data services	
MARISAT F1-F2	INMARSAT Consortium	1976	mobile leased by INMARSAT	in orbit spares
MARECS-B2	ESA	1984	Maritime, aeronautical, land mobile (leased by INMARSAT)	
PANAMSAT	PANAMSAT/ ALPHA-LYRACOM	1988	Video and business Services	
GORIZONT Series <sup>3</sup> and REDUGA	INTERSPUTNIK	see notes	Telephony, telegraphy, television and sound broadcasting	
INMARSAT-II series	INMARSAT	1990 et seq.	maritime, aeronautical land mobile	planned
INTELSAT K	INTELSAT	1992	Television distribution business and data services	planned
ORION <sup>4</sup>	ORION	1993	Video and business services	planned
INMARSAT-III series	INMARSAT	1994 et seq.	maritime, aeronautical land mobile	planned
INTELSAT VII Generation	INTELSAT	see notes	Telephony, television distribution, business and data services	planned

Note : This list does not include announced programmes for which dates are not firmly known, such as the IRIDIUM programme (sponsored by MOTOROLA) and ORBCOMM programme (Orbital Communications Ltd).

- 1 Currently, 6 satellites of the INTELSAT-V generation are used for intra-European services - either television distribution (F4, F6, F7, F11) or Business and Data Communications (F2, F13).
- 2 One satellite of the INTELSAT-VI generation is now operational, and a second is about to become operational.
- 3 Launch dates, capacity, coverage and further details of the GORIZONT and REDUGA satellites are not published, though several are known to be in orbit. They are owned by the USSR and leased to Intersputnik the members of which are, Afganistan, Bulgaria, Cuba, Czechoslovakia, Germany, Hungary, North Korea, Laos, Mongolia, Poland, Romania, the USSR, Vietnam, and Yemen.
- 4 The ORION system, although derived from a licence awarded to a U.S. company, ORION Networks, to provide competing trans-Atlantic services to INTELSAT, is expected to have major European investment when its financing is completed.

### 3. **Current International Coordination Mechanisms: Orbital Positions and Frequencies**

A major influence on satellite communications in Europe are the international coordination procedures with regard to orbital positions and frequencies administered by the International Telecommunications Union (ITU).

Any discussion of the future development of the sector in the Community must take careful account of these procedures and the international commitments of Member States in this area.

Since 1947 the use of radio frequencies is subject to examination in order to limit harmful interference and to ensure the correct use of frequencies in accordance with the internationally agreed Table of Frequency Allocations in the Radio Regulations. The International Frequency Registration Board (IFRB), a permanent body of the ITU, has been given the role to act as the body which administers the internationally agreed frequency allocation and orbit allotment plans and the related criteria for coordination as laid down in the Radio Regulations. The aim is to come to a globally acceptable, effective, equitable and economic utilisation of the radio frequency spectrum and the geostationary satellite orbit. The IFRB receives about 1200 notices/informations per week which need to be examined as required under the Radio Regulations and related agreements.

The aim is to provide, to the maximum possible extent, and on a global scale;

- guarantees, in general, for the interference free operation of radio stations, these being space stations or earth stations, by giving international recognition or protection;
- mechanisms for international coordination of radio networks (including satellite networks) for which the high initial investment requires pre-operational agreements between users;
- guarantees regarding equitable access to the spectrum and the geostationary satellite orbit to all nations.

The provisions of the Radio Regulations can only be modified by the specific world-wide or regional conferences convened by the ITU which are called World (or Regional) Administrative Radio Conferences (WARC or RARC). The convening of such conferences requires detailed technical preparation, often aided by study work undertaken by two other ITU bodies : the International Radio Consultative Committee (CCIR) and the International Consultative Committee for Telephony and Telegraphy (CCITT).

As mentioned earlier, for the purpose of different specific technical application requirements and the assessment of resulting possible interferences, the frequency allocations in the Radio Regulations for space services are divided into various services, the most important being the fixed, mobile, broadcasting and radiodetermination satellite services.

For the fixed satellite services, an allotment plan was developed during the WARC conferences of 1985 and 1988 using some of the 4/6 and 11/14 GHz<sup>12</sup> band frequencies. This plan allots, inter alia, 800 MHz of bandwidth within specified frequency bands on a pre-assigned country-by-country basis and provides each country with at least one orbital position within a predetermined arc. These national allotments consist of a list of parameters which identify the allotment. For national systems the plan provides for a set of procedures to be followed in order to coordinate the national satellite network planned. This WARC-88 plan provides for allotments for existing systems and for those systems (including regional) which have been advance published before May 1988, like the regional EUTELSAT system. The second part of the plan provides for some flexibility in the fixed satellite frequency band through agreed procedures for the non-planned frequency bands through so-called Multilateral Planning Meetings (MPM's) in which future sub-regional or regional systems can be coordinated. These MPM's are a formalisation of the coordination process to ensure equitable access to the remainder of the frequencies and the geo-stationary orbit. However, despite the proviso of these MPM's, the establishment of future pan-European services on (sub-)regional systems is thought still to present significant difficulties due to the complexity and the length of the procedures.

Prior to the described developments for the fixed satellite services, in 1977 a

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<sup>12</sup> The main frequency bands used for satellite communications are in the ranges 1 - 2 GHz (L-band), 2 - 3 GHz (S-band), 3 - 7 GHz (C-band), 7 - 8 GHz (X-band), 10 - 19 GHz (Ku-band), and 17 - 31 GHz (Ka-band; experimental use mainly). The bands mainly used in Europe are those at Ku-band for intra-European traffic, with Ka-band now being used for experiments (OLYMPUS, DFS-Kopernikus, ITALSAT), C-band for transcontinental use on INTELSAT trunks and L-band for mobile communications via INMARSAT.

similar, but far more rigid, approach was taken in the establishment of an allotment plan for the broadcasting satellite services. The WARC-77 Broadcasting satellite plan strictly regulates and allocates precise orbital slots and frequencies on a country-by-country basis for the provision of direct broadcast satellite services (DBS) in an agreed exclusive band in the 12 GHz range. The plan was developed to satisfy the requirements and concerns that existed in 1977 and is based on presumptions which have been overtaken by technological development (see chapters III. and IV.). Amendments to the 1977 plan concept were proposed during the RARC-83 conference but that concerned only the region encompassing the Americas. These improvements on the WARC-77 plan criteria have subsequently been inserted in the Radio Regulations under the terms of the RARC-83.

The improvement of the technology and the rigidity of the WARC-77 plan have led to use, in Europe, of the fixed-satellite services frequency bands for the provision of TV distribution services which can also be received by small home dishes (see chapters III. and IV.). The plan is currently of substantial concern to some of the European space segment providers who plan to provide HDTV services directly to the European audience, and for which the use of higher power DBS satellites is inevitable.

The procedures for coordinating mobile-satellite networks are based on the WARC-79 and WARC MOB-87 results, which have subsequently been incorporated in the Radio Regulations.

In each of the above cases the procedural ways to coordinate and agree new satellite systems have a certain commonality and the same objective. The details of the procedural routes however are considerably different. The common elements can be grouped in three different steps as follows:

1. Advance publication of intent and publication of the available technical specifications of the satellite system in question on which the potential need for coordination can be assessed.
2. The resulting coordination, or agreements with other administrations which are affected by e.g. the intended coverage overspill of a satellite system. Obviously, for systems which are within plan criteria, no coordination is required.

3. After completion of the coordination (or establishment that coordination is not required), notification of frequency usage to the IFRB for inclusion in the so-called Master Frequency Register, so that these systems can claim protection from harmful interference from future systems.

For all intended satellite systems, a set of procedures needs to be followed in accordance with the plans and regulations; each with their own specified time periods in order to achieve timely coordination before the system becomes operational. For most of the national systems which are conceived in accordance with the original plan design parameters, the coordination process will not be required as these systems should be within plan criteria.

However, for other satellite systems, mostly (sub)-regional systems, which are not in accordance with original plan design parameters and therefore not within the plan criteria, the coordination procedures with all affected countries need to be undertaken. These procedures are time consuming, very complex, affect a large number of administrations and also depend on the cooperation and willingness of the affected administrations to come to an agreement. Certainly in the case of sub-regional or regional satellite networks in Europe, the number of administrations to be consulted can be considerable - in the case of the Community Member States, both between any of them and any other neighbouring countries affected by the planned satellite system. For multi-service satellite systems the procedures are particularly complex as at least two and sometimes three sets of procedures need to be followed.

The current situation with regard to the coordination of frequencies and the administration of the orbital source is therefore characterised by:

- the Community Member States acting individually with regard to the international bodies responsible, within a number of Member States the national telecommunications organisations having been mandated by the Member States to act on their behalf in these bodies, while in others the respective ministry represents the Member State<sup>13</sup>;
- non-existent or only loose coordination among the Member States in the framework of the European Conference of Postal and Telecommunications Administrations (CEPT), though this is now changing (see Chapter IV);

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<sup>13</sup> In the case of EUTELSAT the coordination procedures with regard to the ITU are carried out by the French Administration; in the case of INTELSAT, by COMSAT International (U.S.); and in the case of INMARSAT, by British Telecom.

- non-existence of instruments at the Community level to ensure coordinated positions with regard to these bodies - and therefore with regard to the management of the orbital resource and associated frequencies.

The current reform of frequency coordination within the CEPT, under the impact of Council Resolution 90/C 166/02 of 28 June 1990<sup>14</sup>, with the creation of the new European Radiocommunications Committee and the European Radiocommunications Office provides the prospect of substantial strengthening of cooperation in the frequency field.

#### 4. Current Regulatory Conditions in the Community

The regulatory situation in the Community can best be analysed in terms of

- provision and operation of the earth segment, including both receive-only and transmit/receive earth stations;
- the right to use/provide service and/or the licensing conditions required to use/provide service via the space segment;
- access to the frequencies and geostationary satellite orbit, and provision of space segment capacity.

An overview of the situation in the Member States is given in Fig. 4. Overall, the situation in the Member States can be characterised as follows:

##### 4.1 Earth Segment

With regard to receive-only terminals the Green Paper on telecommunications<sup>15</sup> stated that "given the trend in satellite communications towards point-to-multipoint broadcasting applications for closed user groups, the regulatory regime for receive-only earth stations (ROES) for satellite communications should be assimilated to the regime for telecommunications terminals and TV receive-only satellite antennas and fully opened to competition."

<sup>14</sup> O.J. C 166 of 07.07.1990, p. 2. Council Resolution of 28 June 1990 on the strengthening of the Europe-wide cooperation on radio frequencies, in particular with regard to services with a pan-European dimension.

<sup>15</sup> Green Paper on the development of the common market for telecommunications services and equipment, COM(87) 290 of 30.06.1987.

Subsequently, Directive 88/301/EEC<sup>16</sup> implemented this position for "receive-only satellite stations not connected to the public network of a Member State". Fig. 4 shows the current status. The majority of Member States have implemented this position<sup>17</sup>. However, a number of Member States continue to request licenses to operate such equipment.

The ownership and operation of transmit/receive terminals has been traditionally associated in the Member States with the regulation of the up-link/down-link and therefore was restricted, under exclusive or special rights to those who had the right to operate up-links, both as regards provision and operation of equipment (compare Fig. 4).

However, a number of Member States are currently moving towards replacing exclusive or special rights in this area by a system of type-approval and licensing regimes (see below).

#### 4.2 Right to use/provide a service and licensing/type-approval

As shown by Fig. 4, in many Member States, the private operation of satellite-based services is not permitted at all. Where it is permitted, the question of the terms of licences for such services arises. The right to offer satellite services is still often granted on a discretionary basis by Member States' governments.

For receive-only earth stations, a relatively liberal approach has been developed in the majority of Member States, under which receive-only earth stations are treated under the same regime as other terminal equipment (see above). But even in this area, the separation of regulation from operations is still by no means complete in relation to the approval and (where applicable) licensing procedures.

Traditionally, Member States have confined the right to transmit satellite (up-link) signals to the telecommunications organisations. However, more recently, a number of Member States have introduced - or are considering - liberalisation of access to the up-link, such as the UK for one-way services, and the Federal Republic of Germany for one-way and two-way services, under appropriate licensing regimes, including liberalisation of transmit/receive terminals (compare Fig. 4). In the Federal Republic of Germany private users and service providers

<sup>16</sup> Commission Directive of 16 May 1988 on competition in the markets for telecommunications terminal equipment (88/301/EEC), O.J. L 131 of 27.05.1988, p. 73.

<sup>17</sup> Status 1st October 1990.

will in the future be allowed to operate hub-stations and transmit/receive stations under a licensing regime. In the United Kingdom, 7 licences have been granted to operate one-way satellite services including the up-link, in addition to the two organisations, BT and Mercury, which have responsibility for network infrastructure.

**Figure 4**

**Regulatory Environment of Satellite Communications in Community Member States**

COUNTRY	RECEIVE ONLY TERMINALS		HUB STATIONS AND THE PROVISION OF ONE-WAY-SERVICES <sup>1</sup>		TRANSMIT/RECEIVE TERMINALS HUB STATIONS AND THE PROVISION OF TWO-WAY SERVICES <sup>2</sup>	
	TELEVISION	OTHER SERVICES	NATIONAL	INTERNATIONAL	NATIONAL	INTERNATIONAL
BELGIUM	////////	////////	■	■	■	■
DENMARK <sup>3</sup>	////////	////////	////■	////■	■	■
FRANCE	////////	■	■	■	■	■
GERMANY <sup>4</sup>	////////	////////	////////	////////	////////	////////
GREECE	////	////////	■	■	■	■
IRELAND <sup>5</sup>		////////	////■	////■	////■	////■
ITALY		■	■	■	■	■
LUXEMBOURG <sup>6</sup>		////////	■	■	■	■
NETHERLANDS <sup>7</sup>		////////	////■	////■	////■	////■
PORTUGAL <sup>8</sup>	////////	////////	■	■	■	■
SPAIN		////////	■	■	■	■
UK <sup>9</sup>			////////	////////	■	■



Private supply without licencing, type approval or co-ordination.



Provision exclusive to telecommunications organisation



Private supply, subject to licencing, type approval or co-ordination

- 1 Provision of one-way services refers to the provision and operation of the uplink.
- 2 Where two-way services are concerned, provision and operation covers hub station and remote transmit/receive terminals.
- 3 Receive only terminals are subject to type approval and licence for the establishment and operation. The network operator has the exclusive right to provide bearer services (uplink/downlink), whereas private organisations can provide value-added one-way services.
- 4 It is under consideration to delete the individual authorisation for receive-only terminals so that they will only be subject to type approval. The provision of one or two way services has been liberalised, subject to licencing.
- 5 Telecom Eireann has exclusive rights in the provision of national services and is licensed to provide international services. However, competition in the provision of national or international services is not precluded by legislation.
- 6 Terminals in the Fixed Satellite Service are subject to licensing without type approval or coordination.
- 7 PTT Nederland NV has the "right of first refusal" to provide fixed uplink earth stations for one-way or two-way services. If the PTT is not willing or able to provide, within a reasonable time and on reasonable conditions, a system which is equivalent to what the customer wants, the latter may ask the Telecommunications and Post Department of the Ministry of Transport and Public Works for a licence to establish, maintain and/or operate his own fixed uplink earth station.
- 8 TVRO terminals larger than 3m in diameter require a licence. Legislation is under preparation for the liberalisation of the market of receive only terminals for other services.
- 9 No individual licence is needed for receive only terminals ; they are covered by a class licence which is available to all without the need to register or to pay a fee or to be individually co-ordinated. One-way services are subject to licencing for operation within Europe (meaning the European Community, EFTA and other European countries as broadly defined).

#### 4.3 Access to - and provision of - space segment capacity

To obtain space segment capacity, the users or satellite service providers must in general lease capacity from an existing satellite operator. In the European context, as mentioned, the main relevant operators are the international satellite organisations INTELSAT and INMARSAT and the European satellite organisation EUTELSAT; and national or private satellite operators (space segment providers), which provide capacity on systems such as Telecom-1-2, DFS Kopernikus-1 and BSB (refer to Fig. 2). Given that the Member States' telecommunications organisations are the Signatories to the international satellite organisations within each Member State<sup>18</sup>, this means that a potential user requiring space segment capacity is generally obliged to buy this from the telecommunications organisation. In many cases, the telecommunications organisation is a competitor or substitute provider of the service in question. This implies an inherent conflict of interest for the telecommunications organisation.

However, more recently, there are first signs of the establishment of the principle of separation of regulatory and operational responsibilities also with regard to the satellite communications activities of the telecommunications organisations, both concerning the coordination of frequencies as well as the coordination procedures within the international telecommunications satellite organisations.

Recognition of this principle has led in the United Kingdom to the establishment of a separate 'Signatory Affairs Office', separate from British Telecom operational and commercial staff, to manage UK access to the space segment.

The operating agreements of the international satellite organisations give the signatories the right of exclusive resale of space segment capacity. However, as mentioned, the European Broadcasting Union (EBU) has been permitted to purchase space segment capacity directly from EUTELSAT for applications like Eurovision.

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<sup>18</sup> As mentioned, in Italy a special organisation (TELESPAZIO) has been created for this purpose.

