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**Final Report from CEPT to the EC in response to the
Mandate on MSS 2GHz**

**Harmonised technical conditions for the use of the 2 GHz bands
for Mobile Satellite Services in the European Union**

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Content.....	3
Executive summary.....	5
1 Introduction.....	7
2 Services provided by MSS operators.....	8
3 Current situation in the bands 1980-2010 MHz / 2170-2200 MHz.....	10
3.1 Reminder of the regulatory situation.....	10
3.1.1 At ITU level.....	10
3.1.2 At CEPT level.....	10
3.1.3 At EU level.....	12
3.2 Identified MSS projects intending to operate in the bands 1980-2010 MHz / 2170-2200 MHz.....	12
4 Technical and operational conditions for MSS use in the 2GHz bands.....	14
4.1 Adjacent band compatibility between satellite and terrestrial systems.....	14
4.2 Complementary ground components.....	14
4.2.1 Elements about CGC.....	14
4.2.2 Proposed draft definition and conditions with regard to CGC.....	16
4.3 Refarming of the MSS 2GHz bands.....	18
4.3.1 Introduction.....	18
4.3.2 Background information: level of implementation of the ERC/DEC(97)04.....	18
4.3.3 Analysis of the ERC/DEC(97)04, additional considerations and proposals.....	19
5 Possible mechanisms to address situation of potential spectrum shortage.....	20
6 Legacy filings.....	22
6.1 Factual description.....	22
6.1.1 Information related to ITU filings:.....	22
6.1.2 Information related to ERC/ECC regulatory framework:.....	23
6.1.3 National information.....	25
6.1.4 Additional publicly available information.....	25
6.2 ITU rights for the ICO-P system.....	26
6.3 CEPT rights for the ICO-P system.....	26
6.3.1 ICO benefits of a specific status.....	26
6.3.2 ICO does not benefit of a specific status.....	27
7 Harmonisation measures for the 2GHz MSS bands.....	28
7.1 Justification of the need of harmonisation measures.....	28
7.2 Harmonisation measures developed in the ECC.....	29
7 Conclusion.....	30
Annex 1.....	31
Annex 2.....	36
Annex 3.....	4
Annex 4.....	12

Executive summary

This is the final Report developed by the European Conference of Postal and Telecommunications Administrations (CEPT) in response to the European Commission (EC) under the Mandate dealing with the harmonised technical conditions for the use in the European Union of the 2 GHz frequency range (bands 1980-2010 and 2170-2200 MHz) for innovative Mobile Satellite Services (MSS) applications, consisting of systems with a satellite component only or based on a hybrid platform relying on complementary ground component (CGC).

The current regulatory framework for this frequency band in the CEPT is based on a set of ERC Decisions adopted in 1997. Considering the information received, and hereafter provided, on the innovative systems intending to use the MSS 2GHz, there was a need to develop a new regulatory framework concerning the harmonisation of the use of the band for MSS systems.

It is expected that this new CEPT regulatory framework will be established on the basis of, on the one hand, an ECC Decision which will designate the band 1980-2010MHz/2170-2200MHz for the use by MSS systems, including those supplemented by a Complementary Ground Component, will provide harmonised conditions for the use of CGC and ensure adjacent band compatibility between satellite and terrestrial systems. On the other hand, an ECC Recommendation will ensure that administrations will be able to receive information on the progress of the mobile satellite systems candidates to use the 2 GHz bands against a list of milestones.

Also, this new regulatory framework will be completed by a new ECC Decision replacing ERC Decision (97)04 to ensure that the 2 GHz MSS bands will be available in due time for mobile satellite systems.

The issue of the legacy filings in the 2 GHz MSS band is also addressed and an exhaustive description of the situation at ITU, CEPT and national level is provided. This issue will need to be carefully considered in the process of selection and authorisation of MSS systems in Europe.

1 Introduction

This is the final Report developed by the European Conference of Postal and Telecommunications Administrations (CEPT) in response to the European Commission (EC) under the Mandate dealing with MSS 2GHz issues¹.

This Mandate requested CEPT to undertake all necessary work to study the harmonised technical conditions for the use in the European Union of the 2 GHz frequency range (bands 1980-2010 and 2170-2200 MHz) for innovative Mobile Satellite Services (MSS) applications, consisting of systems with a satellite component only or an hybrid system using a satellite supplemented by a complementary ground component (CGC) to provide continuity of services in areas where the satellite signal does not offer sufficient quality.

As required by this Mandate, this report provides the description of the work undertaken and the final results on technical conditions of use of radio spectrum for all types of mobile satellite systems (i.e. with or without CGC) using the bands 1980-2010 MHz and 2170-2200 MHz and also the operational conditions for possible complementary ground components. Among those conditions, the protection of services operating in adjacent bands, in particular terrestrial services in bands identified for IMT-2000/UMTS within CEPT and the study of the current transitional arrangements for the Fixed Service in the 1980-2010 / 2170-2200 MHz bands have also to be considered.

The report also provides elements for mechanisms to address situations where the frequency requirements exceed the available spectrum and to avoid so-called "paper satellites".

In response to a further request from the EC, the report also addresses issues related to legacy 2 GHz MSS systems such as ICO-P.

Finally, the deliverables setting the new regulatory framework within the CEPT for the 2 GHz MSS band expected to be formally approved by December 2006 are attached to this Report.

¹ Mandate to CEPT to study the harmonised technical conditions for the use of the 2 GHz bands for Mobile Satellite Services in the European Union.

2. Services provided by MSS operators

MSS systems can offer instant and reliable global communication systems anywhere in the world together with social, economic, public safety and humanitarian relief benefits. MSS applications may include a large variety of services including road transport services, industry communications, video and radio services, services tailored to the needs of governments, national security requirements, and emergency and disaster relief services. The roll-out and development of these applications is in line with the EU policies on the spread of Information Society and the European Space Policy.²

The importance of the mobile satellite industry has been well recognised by the EU. Space developments have been recently referred to by the European Commission as strategic to the interests of the European Union because they promote economic growth, the knowledge economy and security.³ European Space Policy is currently being developed by the European Commission, the European Space Agency and the EU Member States. Furthermore, a recent study on space and security⁴ recognised that the global security environment has undergone profound changes in recent years and confirmed the importance of satellite technology in dealing with global threats such as terrorism, regional conflicts, state failure and organised crime.

MSS systems provide *ubiquitous* connectivity through widespread, international coverage, with simultaneous access to the satellite service at the instant of service commencement in the entire footprint of the satellite. Such service, although not indispensable for the wider public, is an integral part of some niche markets in which MSS has traditionally provided service including maritime, (which includes distress and safety communications); aeronautical (which includes the provision of communications to aircraft for the purposes of air traffic management, operational communications for airlines and communications for passengers); exploration (for example services to the mining, oil and gas industries); and public safety.

In addition, even on land there are areas within the EU, where terrestrial communications do not reach, or where the service levels of such terrestrial communications systems are not sufficiently high for the needs of consumers, for example in some mainly rural areas where the economics or geography do not support terrestrial system build-out. In such circumstances satellite communications provide an important service to EU consumers, ensuring that they have access to reliable, high quality services and avoiding the creation of a two-tier communications society of the 'haves' and 'have nots'. Satellite services employ cost-effective technology to serve communities with low penetration rates, especially in remote and rural and semi-rural communities. Where sparse population does not provide the economies of scale to justify the roll-out of wireline networks or of land based wireless network requiring a large number of transmitters, satellite networks have historically supplied a swift and efficient deployment of services to communities which would otherwise not have access to such services. Current MSS service provides mobile data speeds up to 0.5 Mbps, which makes it another technology for wireless broadband services. MSS systems can therefore be used to provide broadband services, including content delivery, to rural areas. In the case of MSS the further dimension of mobility is added for these consumers. In the emergence of mobile

² Communication from the Commission to the Council and the European Parliament - European Space Policy - Preliminary Elements, SEC (2005) 664, 23 May 2005.

³ *ibid.*

⁴ Report of the Panel of Experts on Space and Security, 1 March 2005.

broadband services across the EU in the twenty-first century, MSS can again play a vital role in ensuring a seamless telecommunications society across Europe.

The two main characteristics of MSS: resilience (manifested competence in emergency situations) and ubiquity (instant global coverage) make MSS important in the niche markets of emergency disaster relief services and the transport industry. The ubiquitous connectivity of MSS can support the objectives of the trans-European transport network ("TEN-T") initiative of the European Commission by providing seamless communications connectivity to European transport operators.

In the context of the drive to deliver broadband services throughout the European community, the designation of the 2 GHz bands to MSS will promote the rapid deployment and delivery of such services to rural areas, geographically isolated areas and new EU Member States where wireline networks are still in need of significant upgrading before wireline broadband is achievable. In those rural areas where broadband is already or is soon to be available, the deployment of MSS broadband services will provide an alternative service, thereby promoting choice.

The designation of the 2 GHz bands to MSS including the possibility to implement complementary ground components will allow for the development of a range of new markets and services. New satellite technologies (high power platforms, large antennas) together with improved coverage in urban areas will attract larger consumer markets and initiate development of new services such as broadband services. Satellite systems are inherently capable of reaching a larger population of users and as such are very suited for multicasting applications, and the delivery of multimedia services to a large population of users. This type of applications is at the heart of the convergence of services enabled by electronic communications networks. The 2 GHz MSS band has been identified in the draft Radio Spectrum Policy Group Opinion on Multimedia Services⁵ as one possible non-broadcast candidate band for the provision of such services.

Expanded consumer markets will, in turn, reduce the costs of producing handsets and reach economies of scale allowing the overall price of the service to the end users to be more affordable.

⁵ Draft RSPG Opinion - The Introduction of Multimedia Services in particular in the frequency bands allocated to the broadcasting services

3 Current situation in the bands 1980-2010 MHz / 2170-2200 MHz

3.1 Reminder of the regulatory situation

3.1.1 At ITU level

At the ITU level, the bands 1980-2010 / 2170-2200 MHz are allocated in Region 1 to the following services:

- 1980-2010 MHz:

Mobile Satellite Service (Earth-to-space);

Mobile Service;

Fixed Service.

- 2170-2200 MHz:

Mobile Satellite Service (space-to-Earth);

Mobile Service;

Fixed Service.

A certain number of footnotes are also referenced in these bands. The most relevant ones, as far as MSS is concerned, being **No. 5.389A** which refers to **Res. 716** dealing with coordination provisions and FS transitional arrangements and **No. 5.351A** which refers to **Res. 212** (“Implementation of IMT-2000”) and **Res. 225** (“Use of additional frequency bands for the satellite component of IMT-2000”)

3.1.2 At CEPT level

In the bands 1980-2010 MHz / 2170-2200 MHz, the following set of ERC/ECTRA Decisions applies:

- ERC/DEC(97)03: "ERC Decision on the harmonised use of spectrum for Satellite Personal Communications Services (S-PCS) operating within the bands 1610 - 1626.5 MHz, 2483.5 - 2500 MHz, 1980 - 2010 MHz and 2170 - 2200 MHz".

- ERC/DEC(97)04: "ERC Decision on transitional arrangements for the Fixed Service and the Mobile-Satellite Service in the bands 1980 - 2010 MHz and 2170 - 2200 MHz in order to facilitate the harmonised introduction and development of Satellite Personal Communications Services".

- ERC/DEC(97)05: "ERC Decision on free circulation, use and licensing of mobile earth stations of satellite personal communications services (S-PCS) operating within the bands 1610-1626.5 MHz, 2483.5-2500 MHz, 1980-2010 MHz and 2170-2200 MHz within the CEPT".

- ECTRA/DEC(97)02: "ERC Decision on harmonisation of authorisation conditions and co-ordination of procedures in the field of Satellite Personal Communications Services (S-PCS) in Europe, operating within the bands 1610-1626.5 MHz, 2483.5-2500 MHz, 1980-2010 MHz and 2170-2200 MHz".

Studying the first four ERC/ECTRA Decisions above mentioned, it shall be noted that:

- These ERC/ECTRA are dealing with S-PCS systems ensuring voice and data communications (including *facsimile*);
- Three of these ERC/ECTRA Decisions are dealing with two duplex bands: 1610 - 1626.5 / 2483.5 - 2500 MHz on the one hand and 1980 - 2010 / 2170 - 2200 MHz on the other hand;
- The Decision ERC(97)03 imposes the access technology (TDMA) in the upper part of the duplex 1980 - 2010 / 2170 - 2200 MHz bands;
- The Decisions ERC(97)03 and ECTRA(97)02 established a Milestone Review Process which put on an equal footing all S-PCS systems having met a certain number of criteria by 1st January 2001;
- The Decision ERC(97)04 designates the 1980 - 2010 / 2170 - 2200 MHz bands for MSS use and this Decision is widely implemented by CEPT Administrations.

With regard to ERC/DEC(97)03 and more specifically the Milestones review procedure (MRP), after the cut-off date of 1st January 2001, the ERC Plenary studied twice in 2001 what could be the possible evolution of the situation and decided to leave these Decisions as they were until they are due for their next periodic review, possibly by the end of 2003.

The European Common Allocation table (ERC Report 25) allocates the bands 1980 - 2010 MHz / 2170 - 2200 MHz to the Fixed, Mobile and Mobile satellite services and only identifies utilisation of these bands for MSS applications, including UMTS/IMT-2000 satellite component.

Also, the ECC Decision (05)05 on "the harmonised utilisation of spectrum for IMT-2000/UMTS operating within the band 2500 - 2690 MHz" reasserts the use of the above mentioned bands for MSS in considering r):

"r) that the MSS including the satellite component of IMT-2000 will need the following bands for their development and in order to support new innovative MSS services:

1518 – 1525 MHz / 1670 – 1675 MHz

as well as existing pairings at:

1525 – 1559 MHz / 1626.5 - 1660.5 MHz

1610 - 1626.5 MHz / 2483.5 – 2500 MHz

1980 – 2010 MHz / 2170 - 2200 MHz;”

In some CEPT Administrations the bands 1980-2010 MHz / 2170-2200 MHz are allocated nationally for MSS exclusively whereas in other Administrations these bands are allocated nationally either to the Mobile and Mobile satellite services or to the Fixed, Mobile and Mobile satellite services.

3.1.3 At EU level

In 1997 the European Parliament and the Council adopted the Decision N° 710/97/EC “on a coordinated approach in the field of satellite personal-communication services in the Community” (the “S-PCS Decision”) the scope of which being to facilitate the rapid introduction of S-PCS in the Community.

This Decision expired on 31st December 2003, having been extended by another one adopted in May 2000.

Also, in 1999 the European Parliament and the Council adopted the Decision N° 128/99/EC “on the coordinated introduction of a 3rd generation mobile wireless communications system (UMTS) in the Community” (“the UMTS Decision”, expired on 22nd January 2003) which mentioned the satellite component as a part of UMTS.

3.2 Identified MSS projects intending to operate in the bands 1980-2010 MHz / 2170-2200 MHz

Information was collected through a questionnaire sent out by CEPT in October 2004 to Administrations, to (satellite) manufacturer and operator associations and to ETSI and through subsequent contributions. On that basis, it can be noted that:

- there is no commercial MSS usage of the 1980 - 2010 / 2170 - 2200 MHz band in the CEPT countries; only one administration has granted an authorisation for the use of mobile Earth stations (MES) for a MSS operator but no service is provided to the public;
- 13 systems (see table 1 below) are currently identified as having the intention to operate in these bands with a wide diversity of characteristics *inter alia* in terms of satellite interface, network architecture, satellite orbit. Most of them intend to use CGC;
- a large majority of Administrations have implemented ERC/DEC(97)04 about the transitional arrangements for the Fixed Service and Mobile-Satellite Service in the band 1980 - 2010 / 2170 - 2200 MHz and for most of them, the refarming is completed or in the process of being completed.

Systems intending to operate in the bands 1980-2010 / 2170-2200 MHz	With CGC
ATM-MEO	N
Eutelsat	Y
Globalstar-2	Y
ICO-P	TBD
ICO-GS	Y
Inmarsat	Y
KABSAT	Y
NEMO	Y
MSS-1	Y
S-DMB	Y
SMB	Y
TerreStar	Y
Thuraya 2	TBD

Table 1 – Current list of identified MSS projects intending to operate in the 2 GHz MSS band

It shall be noted that there are additional APIs and/or coordination requests submitted to the ITU for systems for which no information has been received so far by the CEPT.

According to the information provided on these systems by the answers to the questionnaire and by additional contributions, it was noticed that they intend to:

- use only the bands 1980-2010 / 2170-2200 MHz among the bands covered by ERC/DEC(97)03;
- use different modulations and access technologies;
- use different types of orbits (GSO, N-GSO) and of coverage area (from a few countries to global);
- provide all or part of the following services: multicast/broadcast data/multimedia/video, (duplex) voice, low and high speed (packet) data, telematics, assistance, search and rescue, emergency services to handheld, portable (PDAs) and vehicular terminals, fleet tracking, SCADA (Supervisory Control And Data Acquisition);
- use, for most of them, a complementary ground component;
- some of the systems intend to start operation in 2008/2009.

It should also be noted that, according to the information provided, the total amount of spectrum needed by the above 13 systems significantly exceeds the 2 x 30 MHz available.

4. Technical and operational conditions for MSS use in the 2GHz bands

This chapter specifically address the issues of:

- adjacent band compatibility between satellite and terrestrial systems;
- CGC;
- Refarming of the 2 GHz bands.

4.1 Adjacent band compatibility between satellite and terrestrial systems

The main issue is the protection of terrestrial services (IMT-2000/UMTS) in the bands below 1980 MHz and 2170 MHz. This issue may be more complex in cases involving systems using a CGC since in that case, the terrestrial stations of the CGC are additional (with respect to terminal and space stations) potential interferers.

So far, three systems (ICO-P⁶, NEMO and S-DMB) as well as one GSO satellite radio-interface SRI-E, have demonstrated that they will protect terrestrial services in the above mentioned cases, for the foreseen air interfaces. However, as far as NEMO is concerned, additional studies are expected involving TDD T-UMTS.

It is expected that adjacent band compatibility between other network/system having different parameters and terrestrial UMTS will be studied within ECC/PT1.

It is considered that in order for MSS systems to be candidate for possible authorisation to operate in the bands 1980-2010 MHz / 2170-2200 MHz, such MSS systems should demonstrate protection of adjacent T-UMTS services.

4.2 Complementary ground components

4.2.1 Elements about CGC

Complementary Ground Components (CGCs), i.e. ground based stations operating at the same frequencies as the associated satellites and used at fixed locations to improve the the availability of MSS, for example in areas where the communication with space stations cannot be guaranteed. Typically CGC can improve the quality of service available to users by ensuring that MSS services can be extended into areas where traditionally service availability has been poor – for example, in buildings, in vehicles, in urban ‘canyons’, and in regions where the topography creates large satellite ‘shadows’ – for example mountainous regions, or regions at the very edge of the satellite footprint. Furthermore, they may play an important role in enhancing the efficiency use of of the radio spectrum. Some types of CGCs can transit traffic from one end user to another without passing through the satellite component of the system, reusing spectrum used by the satellite in another geographical area. Such direct routing would temporarily bypass the satellite component to provide

⁶ The compatibility studies of ICO-P with terrestrial services do not include CGCs.

communications services which are identical to and fully integrated with the service offered throughout the whole MSS system footprint. Such bypass would allow increased spectrum efficiency for MSS , in line with the EU spectrum policy.

An increasing number of MSS operators, are considering the possibility of extending their international MSS operations with CGCs. The United States and Canada recently created a licensing regime for integrated hybrid satellite/terrestrial systems, following which the first licences have been granted. Accordingly, endorsement of the CGC opportunity by the EU and national regulators will put Europe on a level playing field with the United States and Canada, in terms of MSS innovation and services to consumers.

Apart from providing more efficient spectrum use, CGCs will benefit consumers by allowing MSS to provide improved quality of service. Improved coverage would result in continuous development of the ubiquitous connectivity which would be particularly beneficial to transport markets. According to the satellite industry, improved coverage would further attract larger consumer markets resulting in improved economies of scale, which will partially off-set the development costs of new services such as ubiquitous mobile digital telecommunications, mobile broadband and mobile multicast services. This will in turn reduce the costs of producing handsets and the overall price of the service to end users, ensuring that the costs of MSS for core consumers in remote areas (where MSS may be the only option) should reduce markedly.

CGCs differ from independent ground components used by MS operators as they are technically and operationally an integral part of the satellite system and are controlled by the resource and network management mechanism of such system operating on the same frequencies as the associated satellite components and being delivered to an integrated user terminal. While the co-existence of MSS and MS in the same frequency band is impossible, because satellite components and CGCs have a common spectrum control, frequencies can be co-ordinated to ensure that no inter - or intra - system interference is caused.

Satellite systems with CGC already exist in various parts of the world, and in different frequency bands. Some systems are under construction, other systems are already in commercial operation. Four examples of implementation are provided below:

1. The FCC⁷ and Industry Canada⁸ have established respectively in 2003 and 2004 the regulatory framework for MSS Ancillary Terrestrial Component (ATC) in the United-States and in Canada in various MSS bands. In particular it can be noted that in the USA the 2 GHz bands have been made exclusive for MSS due to incompatibility between mobile and mobile satellite systems.

Two MSS/ATC systems under construction are currently licensed *in the 2GHz bands*. Terrestar and ICO, both based on GSO satellites. According to the FCC milestones, ICO has to launch the satellite and certify that entire system is operational by July 2007. Terrestar has to launch its satellite by November 2007 and to certify that the entire system is operational by November 2008. *In the 1.5/1.6 GHz bands*, the MSS/ATC system which has been licensed is Mobile Satellite Venture (MSV). This system is under construction and shall start commercial operation before 26th May 2010. Inmarsat has announced its intention to apply for a license for an ATC

⁷ See ref. Order and Notice FCC 03-15.

⁸ See ref. Notice No. DGTP-006-04 section 5 page 6.

component. *In the 1.6/2.4GHz band*, Globalstar has been licensed by the FCC in January 2006 to operate an ATC component

2. Terrestrial repeaters of S-DAB systems are foreseen in the band 1452-1492 MHz inter alia by ECC DEC(03)02. The E-SDR system (European Satellite Digital Radio) and the Worldspace system are planning to operate in this band with terrestrial repeaters.

3. Terrestrial repeaters of S-DAB systems in the band 2320-2345MHz in the USA. Today the XM-RADIO and SIRIUS RADIO satellite systems are operating in the USA in the band 2320-2345MHz, each using 12.5 MHz. XM-RADIO system includes three GSO Satellites (XM-1 and XM-2, launched in 2001, XM-3 launched in 2005) and a terrestrial repeater network. SIRIUS RADIO system includes three NGSO satellites (Sirius-1, -2, -3 satellites launched in 2000) and a terrestrial repeater network. At March 2006 there are more than 10 millions subscribers for both systems.

4. *Terrestrial repeaters for BSS sound in Japan and Korea in the 2630-2655 MHz band.* The satellite system MBSAT launched in April 2004 is currently operating in Japan and Korea with a GSO Satellite and terrestrial repeaters (also called gap fillers) installed in urban centres in order to improve the coverage in shadowed areas. It provides TV, video and radio programmes in Korea and Japan. As per March 2006, in Korea, there are more than 450 000 subscribers.

Detailed information has been received from two MSS systems on the way their complementary ground components will operate. In Annex 1, technical operation details of these two systems, concentrating on how CGC operates within these MSS systems, are provided as examples.

4.2.2 Proposed draft definition and conditions with regard to CGC

Taking into account:

- the information provided by satellite manufacturers and operators in their answers to the questionnaire and in additional contributions;
- the information available from the regulation of CGC in other parts of the world;
- the proposed designation of the 2 GHz bands for MSS;
- the systems operating in adjacent bands,

a definition and a number of technical and operational conditions have been developed under which MSS systems could operate in the 1980-2010 / 2170-2200 MHz bands with a CGC.

Proposed draft definition:

“The complementary ground component (CGC) is an integral part of a Mobile Satellite system and consists of ground based stations used at fixed locations to improve the availability of the mobile satellite service in zones where the communications with one or several space stations cannot be ensured with the required quality. CGC uses the same portions of the mobile satellite frequency bands (1980-2010 / 2170-2200 MHz) as the associated space station(s).”

Proposed draft conditions:

1) The frequency band to be used by the CGC of a particular satellite system shall be accommodated within the same portions of the frequency band used by the satellite component of that satellite system.

→ the intent of this condition is to ensure efficient use of the spectrum.

2) The use of CGC shall not increase the frequency requirement of the satellite component of that particular mobile satellite system.

→ the intent of this condition is to ensure efficient use of the spectrum.

3) The CGC shall only be deployed in the geographical areas where the mobile Earth stations of the associated MSS network are authorised to operate.

→ if CGC are deployed outside this area of the satellite system, the designation of the band for MSS is not respected any more and compatibility issues may be encountered.

4) The same direction of transmission by CGC and the satellite component shall be used so as to decrease the number and complexity of compatibility issues.

→ intent to avoid harmful interference and ensure efficient use of the spectrum.

5) The satellite segment shall be re-established as soon as possible in case of failure of the satellite segment, and no later than 18 months after such a failure, unless justified otherwise on considerations based on reasonableness and/or proportionality. Otherwise, CGC shall cease operation.

→ this condition is considered as proportionate to meet its objective.

6) Compatibility with terrestrial IMT-2000/UMTS operational systems in adjacent bands shall be ensured.

→ intent to avoid harmful interference and ensure efficient use of the spectrum.

7) CGC shall not operate independently from the satellite resource/network management system.

→ without such dependence, the intra-system compatibility would not be ensured. This condition then intends to ensure efficient use of the spectrum.

4.3 Refarming of the MSS 2GHz bands

4.3.1 Introduction

In the past, the bands 1980-2010 MHz / 2170-2200 MHz were used by Fixed Service in many countries and such use continues, much less intensely, in some of them. In 1997, the ERC adopted the Decision (97)04 "on transitional arrangements for the Fixed Service and the Mobile-Satellite Service in the bands 1980 - 2010 MHz and 2170 - 2200 MHz in order to facilitate the harmonised introduction and development of Satellite Personal Communications Services".

The Project Team studied if the current provisions in ERC/DEC(97)04 with respect to transitional arrangements for the Fixed Service are sufficient to ensure the availability of the band for MSS applications and concluded that modifications to this ERC Decision are required.

A draft new ECC Decision replacing ERC Decision (97)04 has been considered by the ECC July 2006 meeting, sent to public consultation and is expected to be finally approved by December 2006. This draft new ECC Decision sent to public consultation is provided in Annex 2.

4.3.2 Background information: level of implementation of the ERC/DEC(97)04

According to the information available on the ERO web site (9th June 2006) with regard the ERC/DEC(97)04:

- 28 Administrations have implemented it;
- 2 have partly implemented it;
- 2 has committed to implement it, one indicating that the implementation process has started;
- 1 has indicated that there is no FS in the concerned bands;
- 1 has mentioned that the implementation is under study;
- 12 have not provided any information.

It shall be noted that two years ago (May 2004), 27 Administrations were listed as having implemented this ERC Decision. This could be an effect of the current work on MSS 2GHz work and of the questionnaire sent out to the Administrations in October 2004.

Additionally, information received through a questionnaire confirmed the level of refarming of the bands.

From the previous information, the following conclusions can be drawn:

ERC/DEC(97)04 is very widely implemented;

The 2 GHz MSS bands are widely available or nearly available to be used by mobile satellite systems.

However, it should be noted that the continued operation of some terrestrial or aeronautical systems in a few CEPT countries could undermine the actual use of these bands by mobile satellite systems due to aggregated uplink interference to the satellite receiver.

4.3.3 Analysis of the ERC/DEC(97)04, additional considerations and proposals

ERC/DEC(97)04 was analysed in a way to make sure that MSS systems intending to operate in the 2 GHz band will benefit from an available spectrum across CEPT once they open service. According to the information received from industry, this is expected to occur by 2008/2009.

From the relevant sections of ERC/DEC(97)04, it can be understood that:

Administrations having implemented ERC/DEC(97)04 have the obligation to avoid any new FS links in the 1980-2010 / 2170-2200 MHz bands and to withdraw any troposcatter FS systems from the 1980-2010 MHz band;

The refarming of existing FS links (non-troposcatter FS systems) was expected to be completed by 1st January 2005 in at least 25 MHz of the 1980-2010 MHz band, depending on the development of MSS systems.

By the date of starting of operation of MSS systems, it can reasonably be believed that additional Administrations than those indicated in the section above will complete the refarming of the 2 GHz MSS band in due time.

Moreover, as noted above:

- the current information shows that the spectrum needs by MSS systems in the 2 GHz band potentially exceed the 2 x 30 MHz available;
- many Administrations have refarmed the whole band as shown by the answers to the questionnaire.

As a consequence, the minimum of 25 MHz of spectrum to be refarmed is proposed to be increased to the total MSS bandwidth 2x30 MHz but more time (e.g. 2009) should be given to Administrations to do so.

Additionally, the withdrawal of the troposcatter FS systems should be extended to the downlink band (2170-2200 MHz) by the same timeframe.

In addition to the above, other three elements related to the implementation of mobile satellites systems have been considered, but only the first two have been retained in the revision of ERC DEC(97)04, the last one have been the basis of a call, within ECC/WGFM, to the CEPT administrations to avoid the use of aeronautical and radiolocation systems in the 2 GHz MSS bands (as only a very limited number of

administrations are using these systems and as they declared not to prolong such use after the equipment is not operational any more):

- the refarming in the 1980-2010 / 2170-2200 MHz bands should also be applied to the tactical radio relay systems;
- taken into account, on the one hand, the designation by CEPT of the bands 1980-2010 MHz / 2170-2200 MHz for mobile satellite applications and, on the other hand, the refarming of these bands to the benefit of the MSS, it is proposed that Administrations do not request coordination with candidate mobile satellite system;
- it should be ensured that aeronautical and radiolocation systems operated in some CEPT countries that may cause interference to mobile satellite systems will cease operation before the date of operation of the first mobile satellite system, e.g. by 2009.

On the basis of the above, a draft revision of ERC Decision (97)04 has been prepared [and approved for public consultation at the July 2006 ECC meeting] and is provided in Annex 2. It is expected to formally adopt the new ECC Decision replacing ERC Decision (97)04 in December 2006.

5. Possible mechanisms to address situation of potential spectrum shortage

As mentioned above, the total amount of spectrum required by the various systems identified to operate in the bands 1980-2010 MHz / 2170-2200 MHz significantly exceeds the 2 x 30 MHz available. As a consequence, so as to best manage the use of the 2 GHz band by several MSS systems, including the avoidance of the so-called "paper satellites", the several possible solutions have been studied.

It shall be noted that, as a consequence of the decision taken not to develop any selection and authorisation process, these mechanisms are not implemented as such in the regulatory framework expected to be adopted by the ECC by December 2006. However, this section answers to a specific request from the EC Mandate. Also, the ECC is expected to adopt a draft ECC Recommendation aiming at providing information on the progress of MSS candidate systems against a list of milestones (see section 7.2). It was understood that such information would be of high value for the EC in the study of a selection/authorisation process.

It shall also be noted that there is no consensus on the following mechanisms within the ECC. Most of the work has been done on the second one and solution 4 has only been incorporated in the list recently without being debated as the other three.

1. *ITU provisions (and economical/industrial evolution) only*

Under this approach, the process will rely only on the ITU provisions for coordination of satellite networks and associated with due diligence process. The general approach is "first come - first served".

2. *ITU provisions + Milestone Review Process (MRP)*

Under this approach, the ITU provisions would be supplemented by a milestone review process. The milestones would be intended to ensure that only “real systems” are assigned spectrum and that the assignment of spectrum is not unfairly hindered by a system which does not ultimately come to fruition. The process could reserve portions of the band for specific systems which would be identified once the relevant milestones were met. The process should be flexible enough to re-assign spectrum identified to a system if it fails to meet its milestones. Candidate systems should be identified before a fixed start date.

3. *ITU provisions + Memorandum of Understanding (MoU)*

The MoU which can be envisaged under this option would be agreed between the administrations responsible for the MSS systems. Typically such a MoU would include system development milestones within its provisions and would assign spectrum to MSS systems on the basis of their anticipated traffic requirements. The MoU process could allow an annual review of spectrum assignments to each system.

4. *ITU provisions + Division of the available spectrum by the number of candidate*

Under this approach, the process will include the following elements: defined date for the submission of applications; defined date by which systems should offer service with the CEPT; initial spectrum assignment based on a clearly defined and transparent approach, such as divide by n , where n is the number of qualified applicants at the start date for the process; identification of consequences of failure to meet a milestone; process for re-assignment of spectrum that becomes available during the process.

Moreover, the ECC considered a number of principles which could form a basis for evaluation of the different options. These principles still need refinement:

1. There should initially be an opportunity for all candidate systems to participate in the process to use these bands.

1bis. If spectrum demand exceeds supply, the appropriate mechanisms should be used, taking into account spectrum requirements of each system. In any case, actual MSS systems already in commercial service should be duly taken into account when applying these mechanisms.

1ter. the development of the MSS systems and the potential or actual spectrum shortage should be monitored and reported to the ECC accordingly.

2. It should be possible for successful systems to increase their spectrum access or for new systems to enter the band if the initially proposed systems do not proceed, taking into account the availability of the spectrum.

3. An MSS system should use the minimum spectrum necessary to meet its service requirements and the spectrum requirement must be justified.

4. In the event the ECC establishes a process, only those MSS systems which participate in this process should gain the right to authorisation of MSS services in Europe in these bands.

5. The process has to be fair, open and transparent.

6. Legacy filings

This section aims at providing factual information about the regulatory status of legacy 2 GHz MSS systems from both an ITU and a CEPT perspective, with the view to respond to the formal request from the European Commission. In practice, there is only a need to consider the situation of ICO Global's ICO-P NGSO satellite system. It also provides factual information available publicly that is considered of significant interest.

As far as the CEPT level is concerned, the information available leads to two opposed views on the consequences for ICO with respect to the new regulatory framework under development.

6.1 Factual description

6.1.1 Information related to ITU filings:

The ITU filing corresponding to the ICO NGSO system is named ICO-P, notified by the administration of the United Kingdom. The ITU database allows access to the ITU special sections. The a priori exhaustive list of special sections published or submitted at this stage is provided in the table below:

Section n°	IFIC WIC	Date Rx	Date Pub	Frequency band					Comments
				1980- 2010	2010- 2025	2170- 2200	5100- 5250	6925- 7075	
AR11/A/ 1223	2163	16/08/1994	07/02/1995	x		x	x	x	Deadline for max BIU date = 07/02/2004
RES46/A/ 105	2163	16/08/1994	07/02/1995	x		x	x	x	
AR11/A/ 1223-ADD1	2231	16/11/1995	11/06/1996		x				Add 2010-2025 MHz
RES46/C/ 167	2256	16/02/1995	03/12/1996	x		x	x	x	Request for coordination for 10 satellites
RES46/C/ 167-MOD1	2291	06/02/1996	19/08/1997				x	x	10 satellites - only deals with feeder-links
RES46/C/ 167-MOD2	2301	16/05/1996	28/10/1997		x				It is stated that DBIU of 10 first satellites < 1st january 2002; DBIU satellites 11 to 18 < 2 February 2004
RES46/D/ 106	2410	N/A	11/01/2000						Preliminary report on coordination
RES46/D/ 106-MOD1	2414	N/A	07/03/2000						Addition of 1 administration
API/A/ 1219	2415	22/12/1999	21/03/2000	x	x	x	x	x	Postpone BIU date for all bands
CR/C/ 1098	2503	28/09/2001	23/09/2003		x				Complements 2010-2025 MHz
API/A/ 1219-MOD1	2504	28/03/2001	07/10/2003		x				2010-2013.75 & 2021.5-2025 MHz
API/A/ 1219-MOD2	2509	28/03/2001	16/12/2003		x				Correction MOD1 : 2021.25 instead 2021.5
RES49/ 859	2513	20/01/2004	24/02/2004	x	x	x	x	x	BIU = 20.01.2004 / 10 satellites / 5h59 / 10355
BIU declaration		???	N/A						Most probably done before 07/02/2004 deadline
CR/D/ 432	2556	N/A	01/11/2005		x				Report on coordination related to CR/C/1098
Notification			not yet published						Backlog - "As received" information in IFIC 2513. Being processed by BR. 10 satellites
		26/01/2004	published	x	x	x	x	x	

DBIU: Date of Bringing Into Use

This table shows that all the relevant ITU filings for advanced publication, coordination request and notification have been submitted by the UK administration for the ICO-P NGSO system. These filings are consistent with the 10 satellite constellation foreseen for that system.

The information published under resolves 2) of Resolution 49 of the Radio Regulations has been provided to the bureau on 26 January 2004 (i.e. before the regulatory deadline of 07/02/2004) and published on 24 February 2004.

In accordance with ITU regulation, the latest date to bring into use the ICO-P frequency assignments was 07 February 2004.

It should be noted that, as the 2 GHz frequency band is subject to the ITU provisions for the coordination of the frequency assignments of the MSS systems and that for this frequency band, the “first come- first served” principle applies, the ICO-P filing has regulatory precedence.

6.1.2 Information related to ERC/ECC regulatory framework:

The ICO-P system has been taken into consideration within the milestone review process established by the Decisions ERC/DEC(97)03 and ECTRA/DEC(97)02. Under this process, a subset of the 1980-2010 MHz / 2170-2200 MHz was provisionally identified for the ICO-P system, namely 1997.5-2010 MHz / 2187.5-2200 MHz.

For operation in Europe the ICO-P system was (and is still) subject to the provisions of ERC and ECTRA Decisions established in 1997. These Decisions implemented a Milestone Review Process, and this chapter aims at examining the status of the ICO-P system with respect to those milestones, whenever possible based on MRC determinations. The description of such milestones can be found in Annex 2 of ERC/DEC(97)03 and Annex 3 of ECTRA/DEC(97)02.

Milestones 1 to 5

The last trace of an ERC/ECC determination with respect to ICO NGSO system has been found in the minutes of the 30th ERC meeting, held in Paterswolde on 12-16th March 2001 (Document ERC(01)50).

According to this document, the MRC determined in its Recommendation n°3 (REC03), that ICO had fulfilled Milestone 1 to 5.

Milestone 6: Launch of satellites

Milestone 6 is referring to the launch of satellites, and the text is reproduced below:

“6. Launch of satellites

(a) The satellite network operator should make available for inspection by the MRC documents confirming the first successful satellite launch and in-orbit deployment.

(b) The satellite network operator of an NGSO system should also provide periodic evidence of subsequent launches and successful in-orbit deployment of satellites in the constellation.

Provision of documentation relating to (a) shall constitute compliance with this milestone.”

The first ICO satellite has been launched 12 March 2000. This launch failed. The subsequent launch took place on 19 June 2001 and was successful. No other launch occurred since then.

The 30th ERC meeting minutes do not make explicit reference to milestone 6. The minutes of the MRC meeting held in Maisons-Alfort on 18th December 2000 indicates that ICO has not fulfilled milestone 6 at that date.

Therefore, the first attempt to meet Milestone 6a) took place within the deadline of 1 January 2001 set by ERC/DEC(97)03.

Milestone 6b) has not been met, but 6b) is not necessary to meet Milestone 6.

Milestone 7: Frequency coordination

Since compliance with this milestone is only required among those systems having fulfilled milestone 1 to 6 inclusive, and that no other system has been passing through these milestones before 1st January 2001 in the 2 GHz MSS band. ICO has not completed as of 1st January 2001 the frequency coordination. The frequency assignments of ICO-P have been notified to the BR by the UK administration on 26th January 2004.

Milestone 8: Provision of satellite service within CEPT

The milestone 8 requires that the minimum number of satellites to provide continuous commercial service should be launched and that continuous commercial service be provided before 1st January 2001. On the basis on the available information, there has been no continuous nor commercial service provided by the ICO-P system at this stage. Therefore Milestone 8 has not been fulfilled.

Conclusions on Milestone compliance

Therefore it could be concluded that Milestones 1 to 5 were fulfilled in due time with a formal MRC determination. There are diverging views on the compliance of Milestone 6 and 7. Milestone 8 has not been fulfilled. On these 3 latter milestones, there is no MRC determination since MRC has been dissolved after the December 2000 meeting. GMR, as a successor to MRP, did not give further formal determination specific to the ICO status.

As per 1st January 2001, ICO-P was not “ready to provide commercial service within the CEPT” and as a consequence, did not meet this requirement of decides 6 of ERC/DEC(97)03 for being granted provisional authorisation.

Table 2 of Annex 1 of ERC/DEC(97)03 identifies the minimum spectrum required by S-PCS systems. For ICO, this corresponds to 2x12.5 MHz at the upper edge of the bands 1980-2010 MHz / 2170-2200 MHz. The ERC had the power to revise that table pursuant to Decides 7) of ERC/DEC(97)03 based on the failure of systems to meet milestones.

The last meeting of the MRC held in December 2000 considered that at that time there was no spectrum scarcity, and since the ICO-P system was at that time the only 2 GHz system progressing towards implementation, the MRC did not make any recommendation to the ERC on spectrum use. Later on, the GMR did not take action on that aspect either.

Beyond checking the milestone compliance, the MRC was also empowered to monitor the spectrum usage by S-PCS systems as well as the availability of frequencies (§2.2 and 2.3 of Annex 4 of ECTRA/DEC(97)02. With respect to ICO, the MRC was put into a dormant status before it could proceed with such monitoring activity. The GMR focused its monitoring activities on other frequency bands, and did not conduct activities with respect to the use of the 2 GHz band by the ICO NGSO system.

Therefore there is no available information from MRC or GMR on the actual use of 2x12.5 MHz initially identified for the ICO NGSO system in 1997.

6.1.3 National information

The ICO system is currently authorised to provide service in the UK by virtue of the fact that its terminals are licence exempt, and it holds a license under the UK outer-space Act to operate its satellite. The licence exemption regulations permit operation of ICO MESs on frequencies within the 2x12.5 MHz bands identified for ICO in Decision ERC/DEC/(97)03, i.e. 1997.5-2010 MHz and 2187.5-2200 MHz. The UK regulations require that the ICO equipment operates in accordance with ECTRA/ERC Decision (97)05, ERC Decision ERC/DEC(97)03 and ERC Decision ERC/DEC(97)04.

In Germany, ICO has been granted five licenses for the deployment and testing of five Gateway Earth Stations of the ICO-P satellite system. The frequency assignments will expire on December 31, 2006 but may be renewed on request.

The frequency assignments for the ICO-P satellite system grant the licensee temporarily to deploy and operate Gateway Earth Station for testing in the 2 GHz frequency range and in the 5 GHz frequency range. With respect to the 2 GHz range the following frequency band have been assigned for the above mention purposes:

Frequency Band (Earth-to-space)	Tx Power	max. e.i.r.p.
1980 – 1990 MHz	20 mW	26,0 dBW
1980 – 2010 MHz	1 mW	6,8 dBW

Germany indicated to have no information to what extent the frequency assignments are used by the licensee for the testing of the Gateway Earth Stations.

It was noted that no assignments are required in the space-to-Earth direction.

6.1.4 Additional publicly available information

Operational status of the ICO system:

Orbital data:

There is one ICO satellite in orbit (ICO-F2), launched on 19 June 2001. Up to now, ICO-F2 orbit seems controlled and the satellite is orbiting according to its nominal declared parameters.

Detailed information about satellite orbital data is available upon registration at: www.space-track.org.

Information from ICO website:

ICO has represented that out of 10 ICO-P satellites that are in storage, the construction is substantially complete for 8 of them.

The most recent information from the ICO website is dedicated to the ICO GSO system to be deployed over the US. Some information on the NGSO system is nevertheless available. Taking into account the various disclaimer statements, it can be summarized as follows:

- In January 2004, there has been a decision taken by ICO top management to postpone/suspend the development of the ICO-P system in the USA, and to focus on the ICO GSO system, due to US regulatory requirement and to difficulties with the satellite manufacturer.
- There are on-going litigations (also confirmed by FCC documents) between ICO and the NGSO system manufacturer, relating to manufacturing and launch of the NGSO constellation.

Information from the FCC applications

On 15 January 2005, ICO filed to the FCC a request to modify its existing authorisation for a NGSO system, in order to substitute it by a GSO system to be located at 91°W to serve US. This modification was granted by the FCC. It should be reminded that the FCC authorisation only relates to services to be provided in the USA. There are associated GSO filings to the ITU named ICO-G, and submitted by the UK administration.

Service provision

No information could be found on a commercial service provided using ICO F2.

6.2 ITU rights for the ICO-P system

From an ITU perspective, the associated frequency assignments have been brought into use, in due time and therefore the rights associated with this filing would remain valid for a certain period of time.

The administration of the United-Kingdom indicated that, in May 2006, it questioned the Radiocommunication Bureau about the status of the ICO-P assignments and received confirmation by the Bureau, that operation of a single satellite for a NGSO constellation constituted bringing the assignments into use.

6.3 CEPT rights for the ICO-P system

From the above information, two diverging views have been expressed within CEPT:

1) ICO, while it did not meet all the milestones (neither in due time nor after the cut-off date of the MRP), it has demonstrated substantial progress against most of them, with the exclusion of the last one. As a consequence, ICO should benefit of a specific status within the new regulatory framework under elaboration and the ICO-P network should be permitted to operate within the spectrum identified under the ERC Decision ERC/DEC/(97)03, subject to the network entering continuous commercial operation within the CEPT countries in accordance with the new procedures.

2) ICO did not meet the requirement in ERC/DEC(97)03 decides 6 for provisional authorisation, did not meet the milestones by the dead line (1st January 2001), still has not met all these milestones and is not providing any commercial service. ICO therefore has not acquired any rights under the ERC/DEC(97)03 process and should not benefit of any specific status within the new regulatory framework under elaboration, neither at the selection nor at the authorisation process. In particular, it should, as any other candidate mobile satellite system proves compliance with any new Milestones Review Process.

These two views are developed below.

6.3.1 ICO benefits of a specific status

The supporters of this view consider that:

ICO holds certain rights under the ERC decision as well as under national and EU law:

- The ERC decision established a structure for defining that an S-PCS operator would hold a provisional authorization once it satisfied the first 6 of a series of 8

milestones. ICO satisfied up to milestone 7 and its provisional status is vested under the decision.

- The ECC has recognized that ERC decisions on S-PCS have created a “common understanding and expectation” – 29 ECC administrations have implemented ERC DEC (97)03. That structure cannot simply be abrogated without recognition of ICO’s rights.
- ERC Decision (97)03 does not address circumstances in which systems have vested provisional authorizations but have not had their status reviewed as originally envisioned under the milestone review committee procedures.

A basic requirement of EU law is that any decision on spectrum allocation or assignment must be proportionate and non-discriminatory. No EU Member State could adopt an ECC decision that conflicts with these principles.

- Abrogating ICO’s status would be disproportionate in light of the substantial expenditures and efforts it has made towards implementation of its S-PCS system. ICO represented to the ECC that it has spent about US \$4 bn under the structure established under the ERC/DEC(97)03 and continues to expend substantial sums on a monthly basis to maintain its status.
- Creating a new structure for 2 GHz S-PCS milestones and placing ICO at the starting gate on the same level as other applicants would be discriminatory – none of the other potential applicants has taken firm steps while, by contrast, ICO has actually launched a satellite into orbit.
- Creating a new structure for 2 GHz MSS and placing ICO at the same position as other potential applicants will result in a “windfall” situation for later applicants.
- Abrogating ICO’s provisional status would irretrievably harm its ability to raise further investments, which would discourage efficient investment in infrastructure, as ICO is the closest to actual implementation of a fully functioning network in this band.

6.3.2 ICO does not benefit of a specific status

The supporters of this view consider that:

Under the scope of application of ERC/DEC/97(03), those S-PCS systems which met milestone 1 to 6 inclusive and became operational and ready to provide commercial service within the CEPT prior to January 1, 2001, were entitled to operate on a provisional basis their MES’s subject to national authorization, within the provisional identification of frequency bands given in Table 2 of Annex 2 of this ERC Decision. This set of S-PCS systems was clearly limited to Iridium and Globalstar. ICO-P did not meet the above requirement and therefore did not qualify for provisional authorisation.

The ICO-P satellite system was planned to comprise of 10 operating MEO satellites (with 2 spare satellites) in the 2 GHz MSS bands and to operate in the 5/7 GHz MSS feederlinks in order to provide MSS service on an essentially global basis.

The ICO F2 satellite was launched and deployed in June 2001. No further launches have occurred of the ICO-P MEO satellite system since June 2001 to the present date (i.e. a period of circa 5 years).

ICO Global terminated in January 29, 2004 the satellite manufacturing contract with Boeing to complete the construction of the remaining ICO-P MEO satellites (satellites F3 to F12).

ICO Global formally terminated in January 29, 2004 the launch services contract with Boeing to launch the planned constellation of ICO-P MEO satellites (satellites F3 to F10/F12).

ICO Global and Boeing are currently in litigation since around mid 2004. Its outcome is likely to have significant impact on the ability of ICO Global to implement operationally and commercially the ICO-P MEO (10 satellite) system.

An ICO Global company advised the FCC in January 2005 that it no longer intended to develop the ICO-P MEO-based 2 GHz MSS system to serve the USA and instead submitted an application to the FCC to develop a GEO-based 2 GHz MSS system. The FCC subsequently authorised the GEO MSS application of ICO Global. ICO is actively implementing this GEO-based 2 GHz MSS system for providing service in USA.

ICO Global has through the UK Administration filed to the ITU API in mid 2005 for various GEO-based 2 GHz MSS systems, including for GEO satellite locations which could or would be intended to serve Europe.

The various candidate systems to the MSS 2GHz spectrum have spend large amount of money and continue to do so developing their systems. It would be unfair to them to give ICO-P priority.

Granting ICO a CEPT level priority would provide ICO a windfall and would harm the ability of other candidate systems to raise further investments.

Based on the above, it would seem reasonable to consider that unlike the situation with other legacy SPCS / MSS systems such as Iridium (in the 1.6 GHz MSS band) and Globalstar (in the 1.6/2.4 GHz MSS band), the legacy system of ICO-P cannot reasonably claim priority rights for the frequency band 1997.5-2010 MHz and 2187.5-2200 MHz by virtue of the application of the provisions of CEPT ERC/DEC(97)03.

7. Harmonisation measures for the 2GHz MSS bands

7.1 Justification of the need of harmonisation measures

This section addresses the need for harmonisation measures to support the development of MSS services in the 2 GHz bands.

Alternative bands for MSS applications are in the 1.5/1.6 GHz bands and the 1.6/2.4 GHz bands. In the case of the 1.5/1.6 GHz bands, these are currently used by ten GSO MSS operators and there is currently severe congestion which prevents even the existing requirements from being fully met. An additional 2x7 MHz of spectrum in L-band was allocated at WRC-07 and this will provide limited relief to the shortage of spectrum for current services. However it is insufficient to develop new MSS systems aimed at new groups of users and new services. In the case of the 1.6/2.4 GHz bands, these are now well used by non-GSO MSS systems. Not surprisingly therefore, existing and potential new MSS operators are focusing on utilising the only remaining bands, the 2 GHz bands: 1980-2010 MHz and 2170-2200 MHz. The

current CEPT European common allocation table⁹ identifies that the major utilisation in the 2 GHz bands is expected to be MSS.

Studies conducted within ITU-R¹⁰ and the CEPT¹¹ confirm that frequency sharing between MS operators using independent ground components and MSS operators with the same geographical coverage area is impossible because of interference between the two systems. Operating a network of ground stations independently from an MSS system in the same band would create significant interference problems. To avoid interference, separation distances in the order of several hundreds of kilometres between the respective service areas would be required.

The sharing situation is such that terrestrial systems (fixed or mobile) could cause significant interference to MSS operations in the same geographic area in which the terrestrial systems operate, and also in adjacent geographical areas, possibly in different countries. Hence, if the 2 GHz bands are to be made available for the MSS, it is essential that sufficiently robust international harmonisation measures are put into place to ensure that MSS systems can operate without harmful interference.

Harmonisation measures are also necessary for the following reason. Most satellite beams span a number of countries and the same frequency assignments are required in all countries within the beam. A harmonised frequency assignment process for each satellite system is therefore necessary to ensure the availability of the same blocks of spectrum across a number of countries.

The importance of the 2 GHz bands for the MSS has been increased by the CEPT designation of the 2.5 GHz (2500-2520 MHz and 2670-2690 MHz) bands for terrestrial services. The decision of the ECC to designate the 2.5 GHz bands for the terrestrial component of IMT-2000¹² means that the only remaining bands where spectrum is available to MSS are the 2 GHz bands. It may be noted that within CEPT, the designation of the 2.5 GHz bands for MS operations (excluding MSS from these bands) was on the understanding that the 2 GHz bands would be designated for MSS systems.¹³

7.2 Harmonisation measures developed in the ECC

As a result of the needs mentioned in section 7.1 and of the work carried out since July 2004, the ECC has developed a new ECC Decision which designates the 2 GHz bands for networks in mobile satellite service possibly incorporating CGC and provides harmonised conditions for the use of CGC. This draft ECC Decision sent to public consultation at the ECC July 2006 meeting is provided in Annex 3.

Additionally, so as to provide CEPT (and the EC if it request it) information on the progress against milestones of mobile satellite systems candidates in the 2 GHz

⁹ ERC Report 25, European Common Allocation Table (ECA): the European table of frequency allocations and utilisations covering the frequency range 9 kHz to 275 GHz, May 2004.

¹⁰ ITU-R Report M.2041, Sharing and adjacent band compatibility in the 2.5 GHz band between the terrestrial and the satellite components of IMT-2000.

¹¹ ECC Report 45, Sharing adjacent band compatibility between UMST/IMT-2000 in the band 2500-2690 and other services, February 2004.

¹² ECC Decision of 18 March 2005 on Harmonised Utilisation of Spectrum IMT-2000/UMTS systems operating within the band 2500-2690 MHz (ECC/DEC/(05)05).

¹³ See for example ECC Decision of 18 March 2005 on Harmonised Utilisation of Spectrum IMT-2000/UMTS systems operating within the band 2500-2690 MHz (ECC/DEC/(05)05) considering r).

band, a draft ECC Recommendation has been developed and sent to public consultation at the ECC July 2006 meeting. It is provided in Annex 4.

8. Conclusion

In the preparation of the final CEPT Report on the Mandate on MSS 2GHz, and to answer the questions raised under the Mandate, CEPT has studied the following issues:

Adjacent band compatibility between satellite and terrestrial systems:

These studies are finalised for some of the systems under study and will need to be either continued or started for other. However, it shall be noted that no specific difficulties have been encountered so far.

Conditions attached to CGC:

After careful study of the operational and technical characteristics of the CGC intended to be developed by some candidate MSS systems, a definition for CGC and conditions associated with the latter have been proposed.

Refarming of the 2 GHz bands:

Draft proposals for improving the refarming of the 1980-2010 MHz / 2170-2200 MHz bands have been made and a draft new ECC Decision replacing ERC Decision (97)04 is proposed (Annex 2).

On the basis of the above results, a draft ECC Decision ("on the Designation and Conditions of use of the bands 1980-2010 MHz and 2170-2200 MHz by systems in the Mobile Satellite Service (MSS) including those supplemented by a Complementary Ground Component (CGC)") and a draft ECC Recommendation ("on the provision of information on the progress of implementation of the mobile satellite systems which are candidates to use the 1980-2010 MHz and 2170-2200 MHz MSS frequency bands") have been prepared. They are respectively attached in Annexes 3 and 4.

In addition, the CEPT has considered the situation of legacy 2 GHz MSS systems and has provided an analysis of the development of the ICO-P system with respect to the milestones given in ERC/DEC/(97)03. However, it has not been possible to arrive at a common view as to whether the ICO-P system should be granted any rights to use spectrum under the 1997 arrangements.

Details about CGC of systems for which the ECC has received information

The CGCs described in the following section may not encompass all types of CGCs of systems that may be authorised to operate in the 1980-2010 MHz / 2170-2200 MHz band (see also Annex 1).

1 S-DMB

Figure 1 shows the architecture of the S-DMB system (Satellite Digital Multimedia Broadcast) which has been studied and validated within the IST integrated project MAESTRO.

The system architecture combines high power geo-stationary satellites and a limited number of complementary ground components which are deployed in highly shadowed urban/suburban and indoor areas. The system therefore provides outdoor and in-building coverage with nation wide umbrella cells maximizing the potential audience.

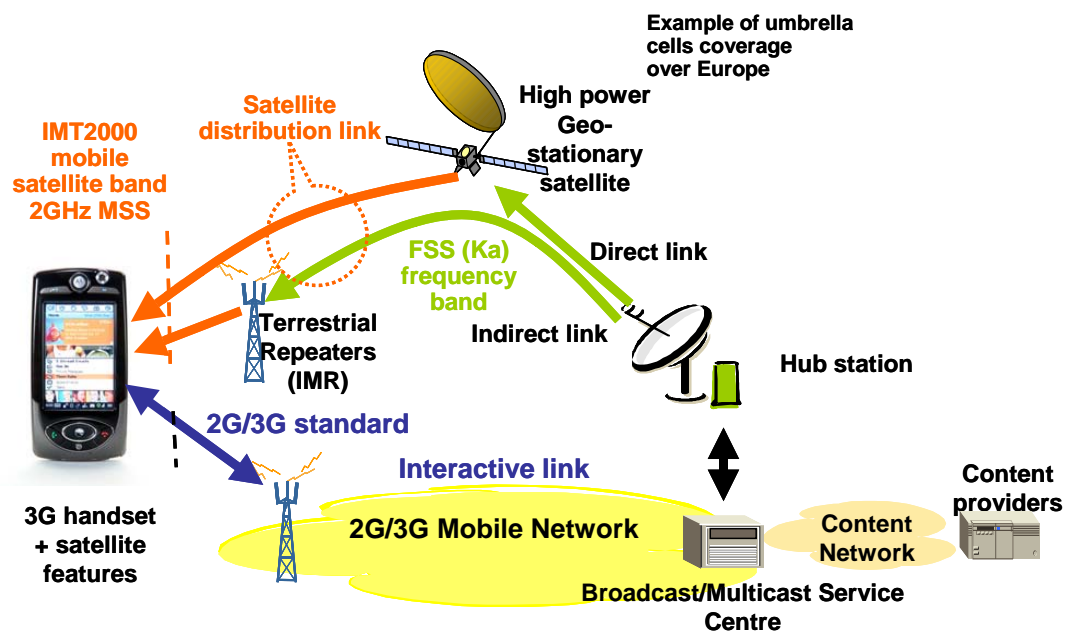


Figure 1 : S-DMB architecture (including freq. Conversion repeaters)

In the above architecture the terrestrial repeaters receive the signal from the satellite in the FSS Ka-band, and down-converts it to the MSS 2GHz band in synchronization with the satellite MSS 2GHz signal. The signals transmitted by the satellite and the repeater(s) are considered as echoes of the same signal and recombined within the terminal.

Figure 2 shows one possible scheme of satellite frequency usage with 3 carriers of 5MHz (F1, F2, F3). The CGC repeat the satellite signal on the same 5MHz downlink frequency carrier as used by the satellite.

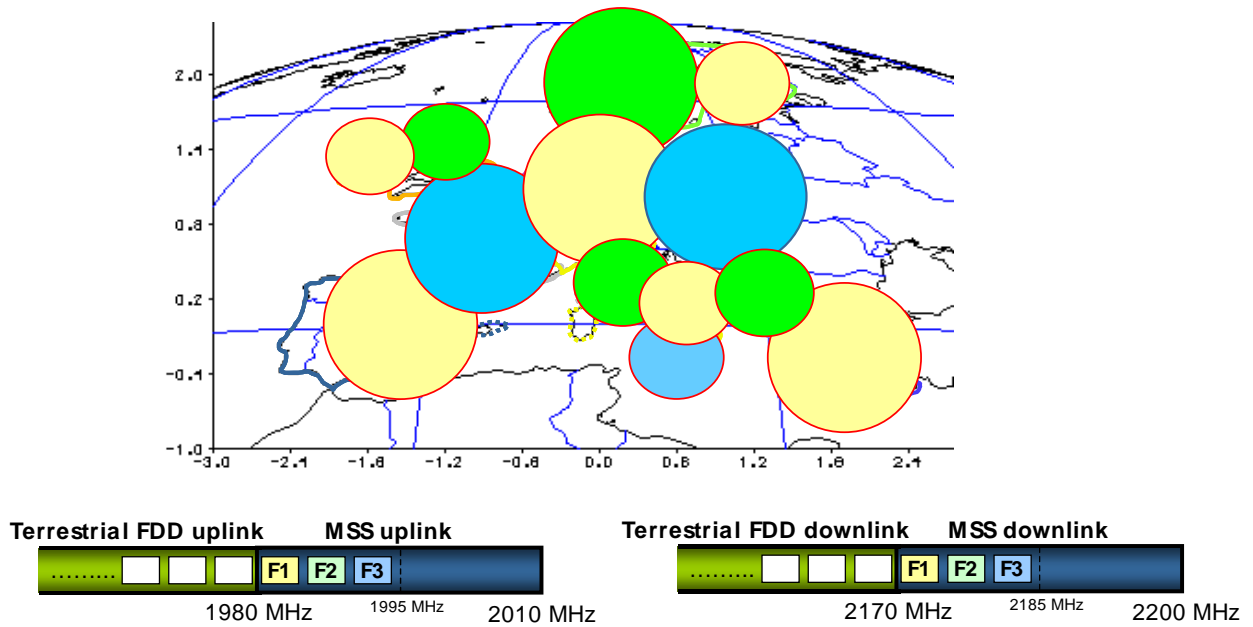


Figure 2 : Example of satellite frequency usage scheme

2 NEMO

The NEMO system plans to operate in the MSS S-band (1980-2010 MHz & 2170 – 2200 MHz). It combines next generation high-performance GEO-mobile satellites with fill-in Complementary Ground Component (CGC) to complement MSS service offerings in zones where satellite links are not available, or there is a blockage of LoS of the satellite link, without using any additional spectrum. Its purpose is to provide a cost effective, continent-wide, dependable mobile infrastructure across Europe for security applications using satellite-enabled regular cell phones.

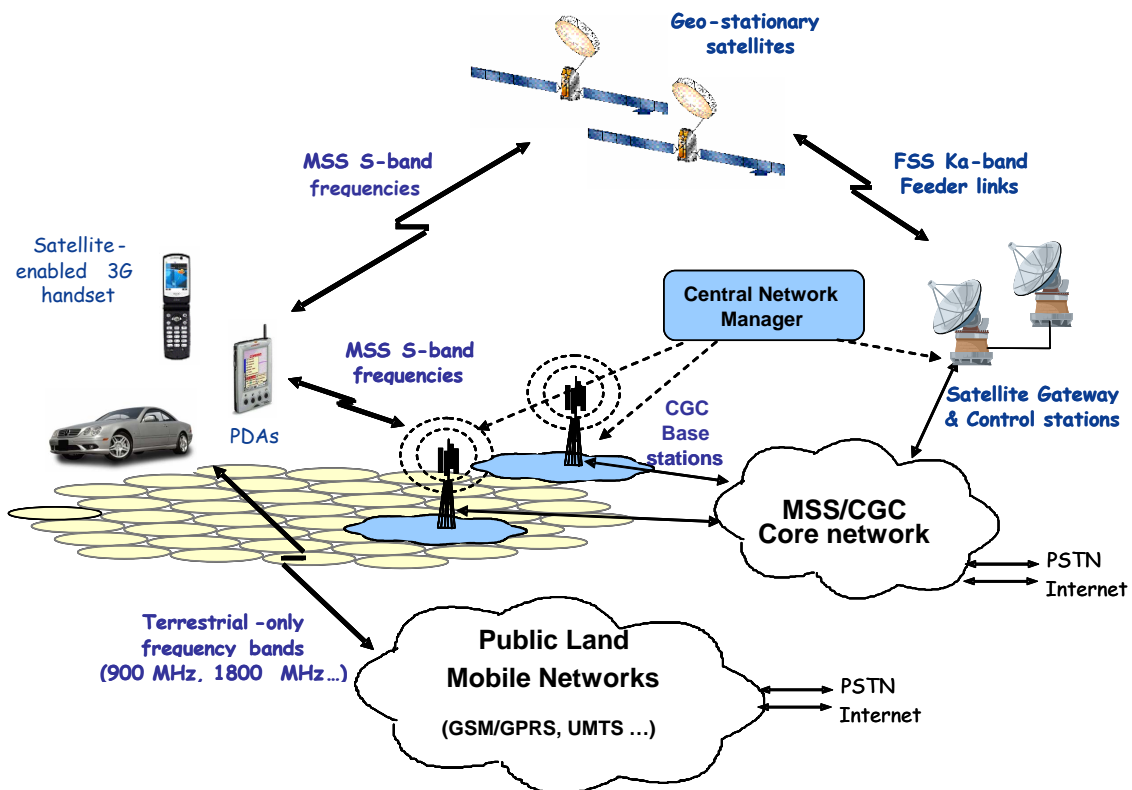


Figure 3: NEMO system architecture

2.1 Description of NEMO CGC operations

A CGS is used to complement a MSS network without using any additional spectrum:

- Use of CGC simply to reuse frequencies consistent with MSS operations
- Use the same frequencies for the CGC and the principal MSS operations
- CGC offerings are integrated with the principal MSS offering (i.e. there is no stand-alone CGC offerings)

The NEMO CGCs obey to the following spectrum sharing rules to prevent the satellite links from suffering from unacceptable intra-system interference:

- Same directions of transmission for satellite and CGC user links (forward-band sharing mode)
- The exclusion zone concept avoids imposing band segmentation between satellite & CGC
- Frequency management needs to be centralised, under the control of the MSS operator

Space satellite network and CGC will be inter-dependant and integrated networks and will be controlled by Central Network Manager in order to optimise the frequency reuse so as to minimize intra-system interference.

Communications of a MES with a CGC may not pass necessarily through the satellite since more economical solutions may exist, this avoid waste of spectrum that would occur otherwise. However, in some circumstances (disaster relief), it may be useful that CGC use satellite links.

Both space satellite network and CGC are necessary and essential for providing high quality, uninterrupted and cost-effective service to NEMO MSS customers. The use of a complementary ground component permits to significantly improve the overall MSS spectrum efficiency.

2.2 NEMO CGC Spectrum sharing concept

Mobile Terminals (MT's) in terrestrial mode can reuse satellite frequencies that would otherwise not be used, i.e. in areas where the satellite Line of Sight signal is significantly obstructed.

Frequencies 'available' for the terrestrial mode depend upon the position of the MT within the satellite cellular coverage. Figure 4 shows a typical satellite frequency reuse pattern (7-colors) and the power spectrum received by a MT at a given position within the coverage. The difference of power level between different frequency channels reflects the difference of antenna gain of each satellite spot beam and shows that some frequencies can be reused locally by the given Mobile Terminal.

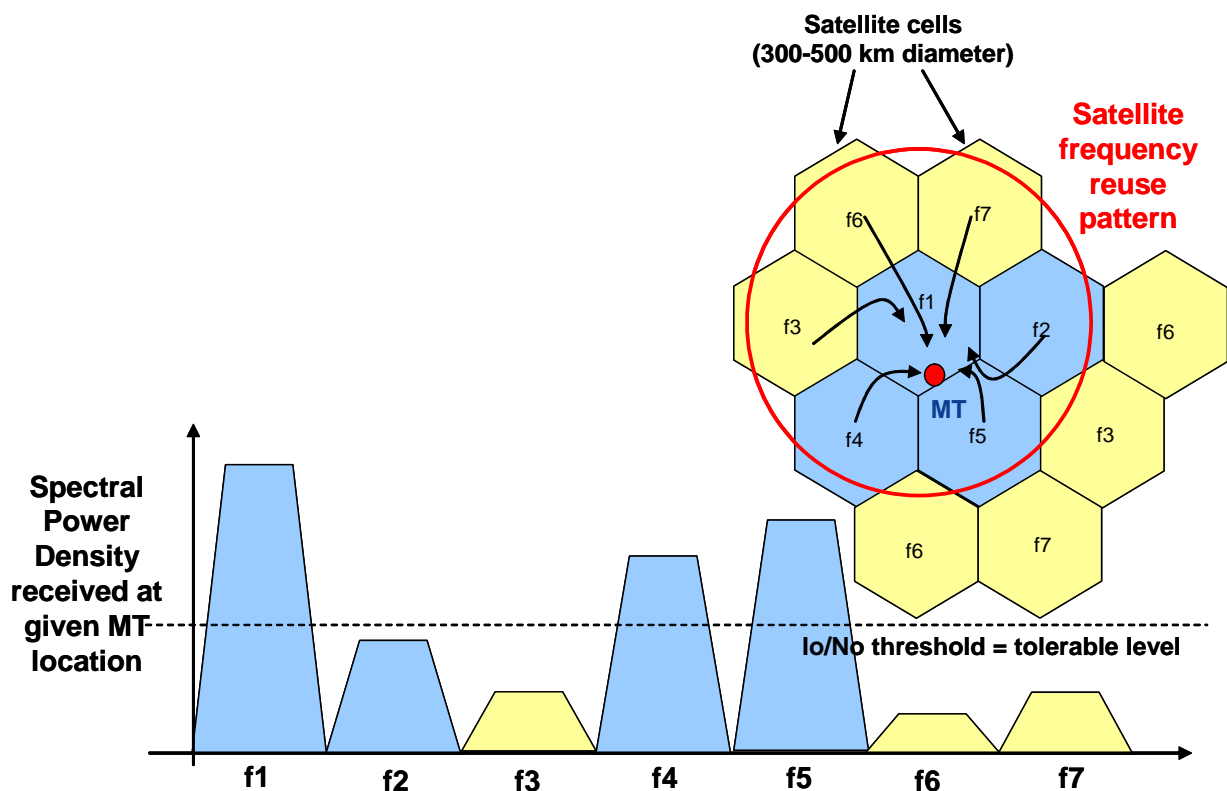


Figure 4: Example of power spectrum transmitted by the space segment at a given MT location

In the figure above, the MT and CGC could use frequencies f_3 , f_6 or f_7 (and potentially f_2) to communicate.

However, frequencies of satellite spot beams surrounding the MT must be avoided in order not to cause potential interference into satellite links.

The set of frequencies available for a given CGC is based on the 'exclusion zones' concept. The exclusion zone is defined as an area around each beam using a given frequency (say f_1). This frequency f_1 can only be reused by auxiliary terrestrial stations that are outside these exclusion zones. The same operation is repeated for beams using f_2 , etc so as to define for each individual auxiliary terrestrial station the set of frequencies that can be reused.

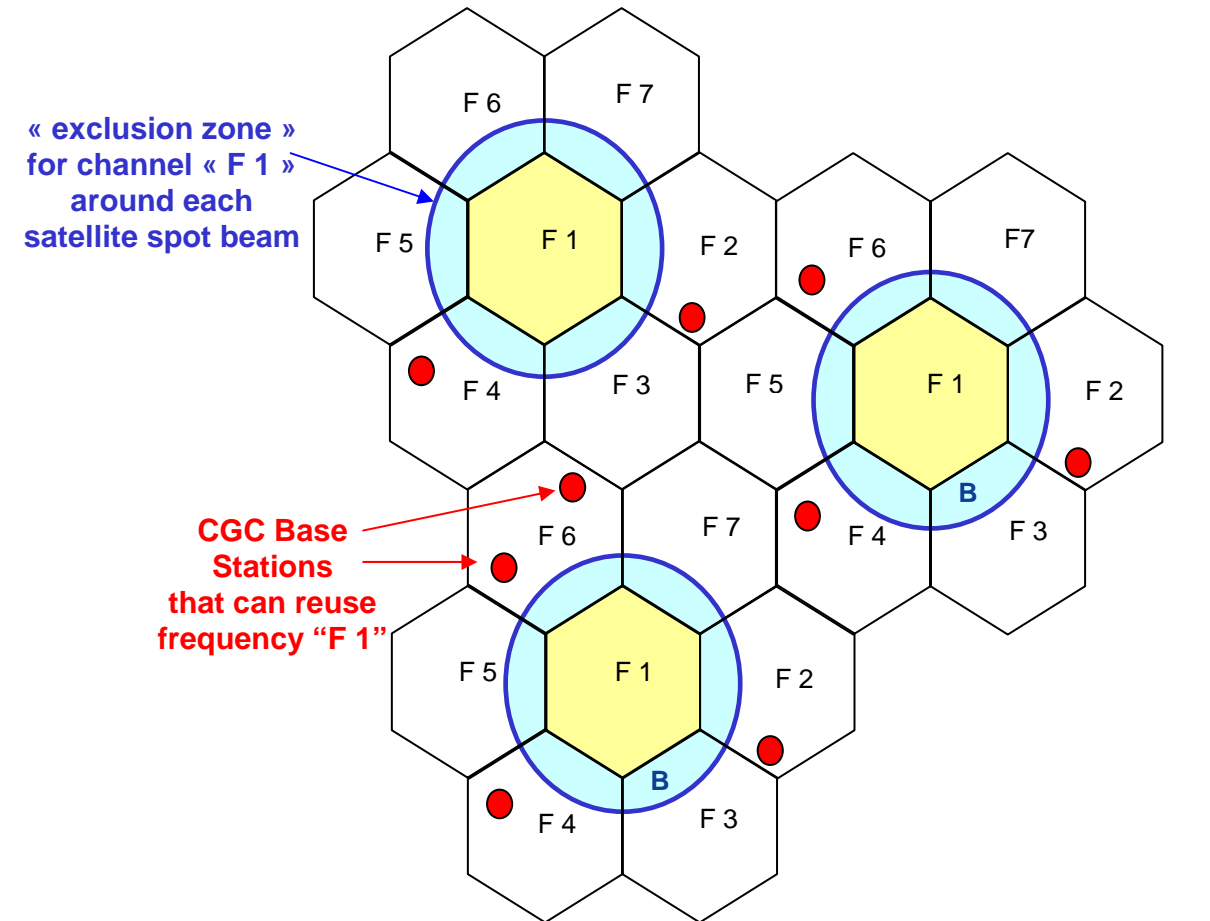


Figure 5: Exclusion zone concept to avoid the use of additional spectrum

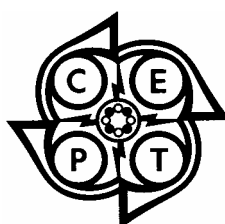
Hence different auxiliary terrestrial stations reuse different set of frequencies, depending on their location within the satellite spot beam coverage. A centralised management of satellite/terrestrial frequencies is thus required.

Band segmentation at system level between satellite & CGC frequencies is not necessary with the exclusion zone concept.

ELECTRONIC COMMUNICATIONS COMMITTEE

ECC Decision
of dd mm yyyy
on transitional arrangements for the Fixed Service and
tactical radio relay systems in the bands 1980-2010
MHz and 2170-2200 MHz in order to facilitate the
harmonised introduction and development of systems in
the Mobile Satellite Service including those
supplemented by a Complementary Ground Component

(ECC/DEC/(XX)YY)



EXPLANATORY MEMORANDUM

1. Introduction

In March 2004, the ECC decided to review the regulatory framework for the Mobile Satellite Service (MSS) in the bands 1980-2010 MHz and 2170-2200 MHz. This review has been undertaken to accommodate a new generation of mobile satellite systems planning to operate in the bands 1980-2010 / 2170-2200 MHz, some of which are intending to provide commercial services by 2009. However, the frequency bands where these services are to be introduced are still partly or totally used by terrestrial fixed services and tactical radio relay systems in some CEPT countries, which are incompatible with mobile satellite systems.

2. Background

In the Table of Frequency Allocations contained in Article 5 of the Radio Regulations of the International Telecommunication Union the MSS and the Fixed Service (FS) are allocated on a co-primary basis. Additionally, some CEPT administrations use tactical radio relay systems in the 1980-2010 MHz / 2170-2200 MHz bands.

By its nature the operation of mobile satellite systems cannot be limited on a national basis and it also requires common frequency blocks to be made available in adjacent geographical areas. Therefore, in order to facilitate the harmonised introduction and development of mobile satellite systems, transitional arrangements are required for the transfer of fixed services and of tactical radio relay systems from the affected frequency bands.

New MSS systems may employ a Complementary Ground Component (CGC) which is a ground-based infrastructure used to enhance satellite coverage in highly shadowed areas.

3. REQUIREMENT FOR AN ECC DECISION

In 1997, ERC/DEC/(97)04 “on transitional arrangements for the Fixed Service and the Mobile-Satellite Service in the bands 1980-2010 MHz and 2170-2200 MHz in order to facilitate the harmonised introduction and development of Satellite Personal Communications Services” was adopted. While it has been widely implemented, fixed service and tactical radio relay systems are still operated in part or all the bands 1980-2010 / 2170-2200 MHz in some CEPT countries.

Additionally, a new ECC Decision, replacing the ERC Decision (97)04, is necessary due to the delay in the use of these bands by mobile satellite systems with respect to the expected date in the late 1990s and the fact that new MSS systems require the whole 2x30 MHz.

Moreover, for the successful introduction of mobile satellite systems throughout the world, manufacturers and operators must be given the confidence to make the necessary investment in this new radiocommunications service. A commitment by CEPT member countries to implement an ECC Decision will provide a clear indication that the required frequency bands will be made available on time at least on a European-wide basis.

**ECC Decision
of dd mm yyyy**

**on transitional arrangements
for the Fixed Service and tactical radio relay systems
in the bands 1980-2010 MHz and 2170-2200 MHz
in order to facilitate the harmonised introduction and development
of systems in the Mobile Satellite Service including those supplemented by a Complementary
Ground Component**

(ECC/DEC/(XX)YY)

The European Conference of Postal and Telecommunications Administrations,

considering:

- a) that WRC-95 allocated the band 1980-2010 MHz to the mobile-satellite service (MSS) in the Earth-to-space direction and allocated the band 2170-2200 MHz to the MSS in the space-to-Earth direction with a date of entry into force of the allocations of 1 January 2000 in Regions 1 and 3;
- b) that the bands 1980-2010 MHz and 2170-2200 MHz are also allocated to the fixed service (FS) and the mobile service, and that the provisions of Resolution 716 (Rev.WRC-2000) apply;
- c) that some satellite operators intend to provide operational service by 2009 in the bands 1980-2010 MHz / 2170-2200 MHz;
- d) that the use of the above bands by the MSS is subject to coordination under the relevant provisions of Article 9 of the ITU Radio Regulations;
- e) that sharing between the MSS and the FS or tactical radio relay systems in these bands is not feasible;
- f) that following WARC-92 many European Administrations established a moratorium on new FS networks in the 2 GHz bands allocated to the MSS. The moratorium was associated with plans to vacate these bands of existing FS networks by around the year 2005;
- g) that CEPT/ERC Recommendation T/R 13-01 and ITU-R Recommendation F.1098 specify channel arrangements for the Fixed Service which should be used for new 2 GHz FS networks in order to avoid overlap with the 2 GHz MSS allocations;
- h) that the bands 1980-2010 MHz / 2170-2200 MHz are still used by some CEPT administrations for FS or tactical radio relay systems and as a consequence are not totally available for use by mobile satellite systems;
- i) that it is anticipated that mobile satellite systems will utilise the entire 2x30 MHz;
- j) that the viable operation of mobile satellite systems requires common frequency blocks to be made available in adjacent geographical areas and that common harmonised frequency solutions are required in Europe;
- k) that the ECC Decision ECC/DEC(06)XX “on the Designation of the bands 1980-2010 MHz and 2170-2200 MHz for use by systems in the Mobile Satellite Service including those supplemented by a Complementary Ground Component” has been adopted in order to facilitate the harmonised introduction of mobile satellite systems in Europe;

- 1) that as the purpose of this ECC Decision is to withdraw the Fixed Service and tactical radio relay systems from the bands 1980-2010 MHz / 2170-2200 MHz, frequency coordination of MSS systems with these terrestrial systems in the interim period is not deemed necessary;

DECIDES

1. that Administrations shall finalise the transitions of existing Fixed Service systems (including troposcatter systems) and tactical radio relay systems operating in or overlapping the 1980-2010 MHz / 2170-2200 MHz bands, no later than one year after the first MSS system has fulfilled milestones 1 to 5 inclusive of Annex 2 of ERC Recommendation ECC/REC/(06)XX;
2. that new FS networks and tactical radio relay systems which are incompatible with MSS operations within the territory of CEPT administrations shall not be implemented in the bands 1980-2010 / 2170-2200 MHz;
3. that in the interim period before the Fixed Service and tactical radio relay systems are withdrawn from the bands 1980-2010 MHz / 2170-2200 MHz, Administrations shall not require coordination of the MSS systems with respect to their fixed service and tactical radio-relay systems;
4. that the ERC/DEC/(97)04 is abrogated;
5. that this Decision shall enter into force on dd mm yyyy;
6. that CEPT Member Administrations shall communicate the national measures implementing this Decision to the ECC Chairman and the Office when the Decision is nationally implemented.

Note:

Please check the Office web site (www.ero.dk) under “Documentation / Implementation” for the up to date position on the implementation of this and other ECC Decisions.

ELECTRONIC COMMUNICATIONS COMMITTEE

ECC Decision
of ZZ WW XX
on the Designation of the bands
1980-2010 MHz and 2170-2200 MHz for use by systems in the Mobile-Satellite Service (MSS) including those
supplemented by a Complementary Ground Component (CGC)

(ECC/DEC/(06)YY)



EXPLANATORY MEMORANDUM

1 INTRODUCTION

In March 2004, the ECC decided to review of the regulatory framework for the Mobile-Satellite Service (MSS) in the bands 1980-2010 MHz and 2170-2200 MHz. This review has been undertaken to accommodate a new generation of mobile satellite systems planning to operate in the bands 1980-2010 / 2170-2200 MHz, some of which intend to provide commercial services by 2009.

2 BACKGROUND

WARC-92 allocated additional spectrum to MSS on a world-wide basis in two band pairs: one at 1610-1626.5MHz (Earth-to-space) / 2483.5-2500 MHz (space-to-Earth) and the other at 1980-2010 MHz (Earth-to-space) / 2170-2200 MHz (space-to-Earth).

In addition, WARC-92 identified the frequency bands 1885-2025 MHz and 2110-2200 MHz for IMT-2000, including 1980-2010 MHz (Earth-to-space) and 2170-2200 MHz (space-to-Earth) for the satellite component of IMT-2000.

To meet the expected growing demand of the mobile telecommunications market, WRC-2000 identified additional spectrum for IMT-2000 in the 2500-2690 MHz frequency range, and the possible use of the 2500-2520 MHz and 2670-2690 MHz frequency bands for the satellite component, as stated in *resolves 2* of Resolution 225 (Rev.WRC-03). In 2005, the ECC adopted ECC/DEC/(05)05 which designates these 2x20 MHz for the terrestrial component of IMT-2000 in Europe. The same ECC Decision recognizes the need for the remaining MSS bands in the 1-3 GHz range for the development of innovative MSS services.

Within CEPT, a regulatory scheme applicable for Satellite Personal Communications Services (S-PCS) was established in 1997. The four CEPT Decisions which provided the basis for authorising S-PCS systems throughout Europe were:

- ERC Decision 97(03) relating to the Harmonised Use of Spectrum for Satellite Personal Communications Services (S-PCS) operating within the bands 1610-1626.5 MHz, 2483.5-2500 MHz, 1980-2010 MHz and 2170-2200 MHz;
- ERC Decision 97(04) relating to the Transitional Arrangements for the Fixed Service and the Mobile-Satellite Service in the Bands 1980-2010 MHz and 2170-2200 MHz in order to Facilitate the Harmonised Introduction and Development of Satellite Personal Communications Services;
- ERC Decision 97(05) on Free Circulation, Use and Licensing of Mobile Earth Stations of Satellite Personal Communications Services (S-PCS) operating within the bands 1610-1626.5 MHz, 2483.5-2500 MHz, 1980-2010 MHz and 2170-2200 MHz within the CEPT; and
- ECTRA Decision (97)02 on Harmonisation of Authorisation Conditions and Co-ordination of Procedures in the field of Satellite Personal Communications Services (S-PCS) in Europe, operating within the bands 1610-1626.5 MHz, 2483.5-2500 MHz, 1980-2010 MHz and 2170-2200 MHz.

By 2004, a number of MSS systems have been proposed to operate in the 2 GHz bands with the view to offer a variety of services, such as point-to-point ubiquitous mobile connectivity, broadcast/multicast to handset terminals, security services (population alert and rescue support), data collection, fleet tracking, etc. The majority of the proposed systems rely on a ground-based infrastructure to enhance satellite coverage in highly shadowed areas. It should be noted that similar developments have occurred in Asia and in North-America where appropriate regulatory frameworks have been set-up. In this Decision, such a ground based infrastructure operating within the bands 1980-2010 / 2170-2200 MHz is named a Complementary Ground Component (CGC).

The 1997 set of Decisions covered the bands 1.6/2.4 GHz and 2 GHz. The 1.6/2.4 GHz bands are occupied by operational MSS systems offering commercial service.

There are a number of reasons for which that set of Decisions is not suitable for new systems intending to operate in the 1980-2010 MHz and 2170-2200 MHz frequency bands:

- The applicability of the 1997 set of Decisions to systems to be brought into use after 1st January 2001 is unclear.

- The 1997 set of CEPT Decisions applied to S-PCS systems only. New services may not fit within the definition of S-PCS. Therefore, there is a need to broaden the scope to encompass an extended range of applications.
- The band splitting arrangements contained in the 1997 framework for the 2 GHz bands may contradict a technology neutral approach to regulation.
- The use of a complementary ground component for MSS systems was not envisaged in 1997.

New, innovative MSS systems with complementary ground components aim at two objectives:

- Universal access to the service by removing the restriction resulting from lack of satellite signal availability in highly shadowed areas.
- Increase spectrum efficiency. In recent years, spectrum demand for new communication services in the “mobility bands” below 3 GHz has increased drastically, resulting in added pressure to use the spectrum in more efficient ways.

In the following, some different network architectures are described through examples which are based on systems under development or already in commercial operation.

One example is the case where ground based stations provide an extension of the same information carried on the MSS system, through direct interconnection with the MSS system, and so using the same frequencies as the satellite, into areas where blockage or other factors would otherwise result in unsatisfactory reception from the MSS system. This type of technical implementation is used in the band 2320-2345 MHz in the USA with the XM-Radio (GSO) and Sirius Radio (N-GSO) systems. In such a case, there is no return link.

A variation of this example is the case, as for MBSAT launched in April 2004 and operating in the 2.5 GHz band in Japan and Korea, where the information is transmitted to the ground based stations in the Ku band and not directly in the 2.5 GHz band.

An example within CEPT is the possible use of terrestrial repeaters in S-DAB systems operating in the band 1452-1492 MHz, covered by ECC DEC(03)02. In this case, the ground based stations are used to extend the same information carried on the satellite but without necessarily using the same frequencies as the space station. The E-SDR system (European Satellite Digital Radio) plans to operate in this band with terrestrial repeaters according to this latter configuration.

Among the systems operating both in the Earth-to-space and space-to-Earth directions, several architectures are being developed. Those being developed in North America use additional ground stations (Ancillary Terrestrial Component – ATC – in the FCC regulation) operating at frequencies in the MSS bands (1.5/1.6 GHz, 2 GHz or 1.6/2.4 GHz) which have been assigned to the particular MSS system. Some of these systems are expected to start commercial operation in the 2 GHz bands before November 2007. So as to optimise the use of the spectrum, all the information carried through the ATC need not pass through the space station.

3 REQUIREMENT FOR AN ECC DECISION

The ECC recognises that a harmonised framework for the implementation of MSS in the bands 1980-2010 MHz and 2170-2200 MHz will be beneficial to satellite operators and manufacturers, and will benefit to the public with the availability of innovative new services.

The ECC recognises that for MSS to develop, manufacturers and operators must be given the confidence to make the necessary investment. In particular, satellite systems require high upfront investment which can only be achieved if a long term visibility on the regulatory environment exists.

The ECC believes that the trans-national nature of satellite services necessitates the harmonised use of the considered frequency bands across the CEPT, and a commitment by CEPT member countries to implement this Decision will provide a clear framework to National Regulatory Authorities and operators to enable the implementation of these satellite services.

The issue of trans-border frequency coordination between two CGC networks and between CGC and terrestrial stations operating in adjacent bands is outside the scope of this Decision and will be addressed by the ECC in future works.

This ECC Decision provides the necessary provisions for the designation and the conditions of use of the bands 1980 - 2010 MHz and 2170 - 2200 MHz by systems in the Mobile-satellite service including those supplemented by a complementary ground component.

**ECC Decision
of ZZ WW YY**

**ECC Decision on the Designation of use of the bands
1980-2010 MHz and 2170-2200 MHz by systems in the Mobile-Satellite Service including those
supplemented by a Complementary Ground Component**

(ECC/DEC/(06)YY)

The European Conference of Postal and Telecommunications Administrations,

considering:

- a) that WARC-92 allocated the bands 1980-2010 MHz (Earth-to-space) and 2170-2200 MHz (space-to-Earth) to the Mobile-satellite service (MSS) on a co-primary basis with fixed and mobile services;
- b) that in ERC Report 25¹⁴, it is indicated that the major utilisation expected beyond 2008 in the bands 1980-2010 MHz / 2170-2200 MHz is for applications in the Mobile-satellite service including the satellite component of the IMT-2000;
- c) that CEPT adopted in 1997 a set of ERC and ECTRA Decisions dealing with satellite systems providing Satellite Personal Communication Service (S-PCS) which cover, *inter alia*, in the bands mentioned in *considering a* ;
- d) that *considering r*) of the ECC DEC(05)05 mentions that the MSS including the satellite component of IMT-2000 will, *inter alia*, need the bands 1980–2010 MHz / 2170-2200 MHz for their development and in order to support new innovative MSS services;
- e) that there is a need to adjust the regulation set mentioned in *considering c*) for a number of reasons, including the introduction of provisions in the bands 1980-2010 MHz and 2170-2200 MHz to facilitate the implementation of mobile satellite systems which may incorporate a complementary ground component (CGC);
- f) that the period of time mentioned in condition 5 of Annex 1 may be difficult to meet in case of particular circumstances;
- g) that adjacent band compatibility between mobile satellite systems in the bands 1980-2010 MHz / 2170-2200 MHz and terrestrial systems in the mobile service in the bands below 1980 MHz and between 2010 and 2170 MHz should be duly taken into account;
- h) that the use of the bands 1980-2010 MHz and 2170-2200 MHz by mobile satellite systems is subject to coordination provisions under the Radio Regulations;
- i) that, under the ITU Radio Regulations provisions, the use of the bands 1980-2010 MHz and 2170-2200 MHz by the Mobile-satellite service is open to any type of technology and any type of satellite orbit;
- j) that the use of the bands 1980-2010 MHz and 2170-2200 MHz by mobile satellite systems is subject to frequency coordination with the fixed service and that the migration of the fixed-service stations from the bands concerned is addressed by Resolution 716 (Rev.WRC-2000) (see RR No. 5.389A) and, as applicable, [ERC DEC(97)04];

¹⁴ The European Table of Frequency allocations and utilisations covering the frequency range 9 kHz to 275 GHz

- k) that the ERC DEC/(97)04 dealing with the migration of the fixed service systems from the bands 1980 - 2010 MHz and 2170 - 2200 MHz was widely implemented and that this ERC Decision is superseded by [ECC DEC(06)ZZ] on “*transitional arrangements for the Fixed Service and tactical radio relay systems in the bands 1980-2010 MHz and 2170-2200 MHz in order to facilitate the harmonised introduction and development of systems in the Mobile-Satellite Service including those supplemented by a Complementary Ground Component*”;
- l) that the co-frequency operation of mobile satellite systems with respect to terrestrial mobile systems has been studied in similar frequency bands within the ECC and has proven to be unfeasible (see ECC Report 45) unless there are separation distances, in the order of several hundreds of kilometres, between the respective service areas

DECIDES

- 1. that the frequency bands 1980-2010 MHz (Earth-to-space) and 2170-2200 MHz (space-to-Earth) are designated for systems of the Mobile-satellite service;
- 2. that these mobile satellite systems may incorporate a Complementary Ground Component (CGC);
- 3. that, for the purpose of this ECC Decision, CGC is defined as follows:
 - CGC is an integral part of a mobile satellite system and consists of ground based stations used at fixed locations to improve the availability of the mobile satellite system in zones where the communications with one or several space stations cannot be ensured with the required quality. CGC uses the same portions of the Mobile-satellite service frequency bands (1980-2010 / 2170-2200 MHz) as authorised for the associated space station(s);
- 4. that mobile satellite systems incorporating a CGC shall meet the conditions given in Annex 1;
- 5. that, in case of particular circumstances, the ECC will study the appropriateness of extending the period of 18 months mentioned in condition 5 of Annex 1;
- 6. that mobile satellite systems operating in accordance with this Decision shall ensure compatibility with terrestrial systems operating in the mobile service in the adjacent bands below 1980 MHz and between 2010 MHz and 2170 MHz;
- 7. that this Decision shall enter into force on XX YY ZZ;
- 8. that CEPT Member Administrations shall communicate the national measures implementing this Decision to the ECC Chairman and the Office when the Decision is nationally implemented.

Note:

Please check the Office web site (www.ero.dk) under “Documentation / Implementation” for the up to date position on the implementation of this and other ECC Decisions.

ANNEX 1

Conditions for mobile satellite systems incorporating a complementary ground component

- 1) The frequency band to be used by the CGC of a particular satellite system shall be accommodated within the same frequency band used by the satellite component of that satellite system.
- 2) The use of CGC shall not increase the spectrum requirement of the satellite component of that particular mobile satellite system.
- 3) The CGC shall only be deployed in the geographical areas where the mobile Earth stations of the associated MSS system are authorised to operate.
- 4) The same direction of transmission by CGC and the satellite component shall be used so as to decrease the number and complexity of compatibility issues.
- 5) The satellite segment shall be re-established as soon as possible in case of failure of the satellite segment, and no later than 18 months after such a failure, unless justified otherwise on considerations based on reasonableness and/or proportionality. Otherwise, CGC shall cease operation.
- 6) Compatibility with terrestrial IMT-2000/UMTS operational systems in adjacent bands should be ensured.
- 7) The CGC shall not operate independently from the satellite resource/network management system.



European Conference of Postal and Telecommunications Administrations (CEPT)
Electronic Communications Committee (ECC)

ECC Recommendation (06)XX

On the provision of information on the progress of implementation of the mobile satellite systems which are candidates to use the 1980-2010 MHz and 2170-2200 MHz MSS frequency bands

INTRODUCTION

The ECC has adopted the ECC Decision (06)XX on “*the Designation of the bands 1980-2010 MHz and 2170-2200 MHz for use by systems in the Mobile-Satellite Service (MSS) including those supplemented by a Complementary Ground Component (CGC)*” so as to facilitate the introduction of mobile satellite systems in the 2 GHz MSS bands.

It was considered useful for the CEPT administrations, and also other interested parties, to have information on the progress made in the development of the candidate mobile satellite systems in the perspective of the provision of authorisations to the latter.

This ECC Recommendation provides the relevant framework to enable the availability of such information on the basis of progress against milestones by those mobile satellite systems.

Considering:

- a) that the ECC has adopted the ECC Decision (06)XX on “*the Designation of the bands 1980-2010 MHz and 2170-2200 MHz for use by systems in the Mobile-Satellite Service (MSS) including those supplemented by a Complementary Ground Component (CGC)*”;
- b) that there is a need for administrations to gather information on the planned dates of completion of identified milestones and on the progress of the candidate systems against each milestone;
- c) that a common approach for the authorisation process is considered necessary for which the information gathered *via* this Recommendation could be useful;

Recommends:

1. that the list of candidate mobile satellite systems intending to operate in the bands designated in ECC/DEC (06)YY be in Annex 1 of this Recommendation, and that the requirements for inclusion in Annex 1 be as follows:

- a. submission of the request for coordination filing for the mobile satellite system to the ITU;
- b. description of the system made available by the relevant¹⁵ CEPT Administration to the ECC, including the number of satellite(s) necessary to provide commercial service and the date at which the system is planned to be in commercial operation.

2. that the information in Recommends 1 should be provided by [30 June 2007] by the relevant CEPT administration. The information in Annex 1 should also indicate the planned dates for each milestone identified in Annex 2

3. that relevant CEPT administrations should provide information to the Office regarding the development of the candidate MSS systems in respect of the milestones. The Office will inform the ECC accordingly and the ECC will record in Annex 1 the progress of each MSS system against the declared milestone dates for each system;

4. that the information in Annex 1, as well as the outcome of the process referred to in *considering c)*, should be taken into account by the CEPT administrations in their frequency authorisation process;

¹⁵ A relevant CEPT administration is either the notifying administration when the latter is a member of CEPT or the supporting CEPT administration otherwise.

Annex 1

List of Candidate systems:

For each candidate system:

Milestone	Planned date for completion	Actual date of completion
1		
2		
3		
4		
5		
6		
7		
8		
9		

Annex 2

Milestones for the introduction of MSS systems within the bands 1980 - 2010 MHz and 2170 - 2200 MHz

INTRODUCTION

The milestones information to be supplied to the ECC are listed below.

A satellite system operator may be represented by different service providers in different countries.

Information supplied to the ECC, through the relevant CEPT administration, in relation to progress against the relevant milestones below regarding a particular MSS system should relate to the MSS system described in the submission made in accordance with

Recommends 1.

MILESTONES

1. Submission of ITU request for co-ordination

The satellite system operator shall provide clear evidence that the administration responsible for an MSS system has submitted the relevant ITU RR Appendix 4 information.

2. Satellite manufacturing

The satellite system operator shall provide clear evidence of a binding agreement for the manufacture of its satellites. The document shall identify the construction milestones leading to the completion of manufacture of satellites required for the commercial service provision. The document shall be signed by the satellite system operator and the satellite manufacturing company.

3. Completion of the Critical Design Review

The Critical Design Review is the stage in the spacecraft implementation process at which the design and development phase ends and the manufacturing phase starts.

The satellite system operator shall provide clear evidence of the completion of the Critical Design Review in accordance with the construction milestones indicated in the satellite manufacturing. The declaration shall be signed by the satellite manufacturing company and shall indicate the date of the completion of the Critical Design Review.

4. Satellite launch agreement

The satellite system operator shall provide clear evidence of a binding agreement to launch the minimum number of satellites required to provide a continuous service within the territories of CEPT countries. The document shall identify the launch dates and launch services and the indemnity contract. The document shall be signed by the satellite system operator and the satellite launching companies.

5. Gateway Earth Stations

The satellite system operator shall provide clear evidence of a binding agreement for the construction and installation of Gateway Earth Stations that will be used to provide MSS services within the territories of CEPT countries.

6. Satellite mating

The mating is the stage in the spacecraft implementation process at which the Communication Module (CM) is integrated with the Service Module (SM).

The satellite system operator shall provide clear evidence that the Test Readiness Review for SM/CM mating has taken place in accordance with the construction milestones indicated in the satellite manufacturing. The declaration shall be signed by the satellite manufacturing company and shall indicate the date of the completion of the satellite mating.

7. Launch of satellites

(a) The satellite system operator shall provide documents confirming the first successful satellite launch and in-orbit deployment.

(b) The satellite system operator of an NGSO system shall also provide periodic evidence of subsequent launches and successful in-orbit deployment of the necessary number of satellites in the constellation to provide commercial service.

8. Frequency co-ordination

The satellite system operator shall provide documents relating to the successful frequency co-ordination of the system with respect to other MSS systems pursuant to the relevant provisions of the Radio Regulations. However, a system which demonstrates compliance with milestones 1 to 7 inclusive is not obliged to demonstrate at this stage completion of successful frequency co-ordination with those MSS systems which fail to comply adequately and reasonably with milestones 1 to 7 inclusive.

9. Provision of satellite service within the territories of CEPT countries

The satellite system operator shall provide notification that it has launched, and has available for the provision of service, the number of satellites it previously identified under milestone 4 as necessary to provide continuous commercial service, and that it is currently or will be providing commercial service within the territories of CEPT countries using parts of the frequency bands 1980-2010 / 2170-2200 MHz.