



# ECC Decision (13)01

The harmonised use, free circulation and exemption from individual licensing of Earth Stations On Mobile Platforms (ESOMPs) within the frequency bands 17.3-20.2 GHz and 27.5-30.0 GHz

**Approved 8 March 2013**

## EXPLANATORY MEMORANDUM

### 1 INTRODUCTION

This ECC Decision addresses the use of Earth Stations On Mobile Platforms (ESOMPs) which operate within the frequency bands 17.3-20.2 GHz (space-to-Earth) and 27.5-30.0 GHz (Earth-to-space). ESOMPs operate in Fixed Satellite Service (FSS) networks and are terminals with small directional antennas for the provision of broadband communication services. The terminals may be mounted on aircraft, ships or land vehicles or may be transportable devices used in motion or at temporary halts. ESOMPs on aircraft and ships may operate in national airspace and waters, or may also operate in international airspace and international waters. This Decision relates only to ESOMPs operating in geostationary satellite networks.

### 2 BACKGROUND

In recent years a number of FSS networks have been launched which operate in the “Ka-band” frequencies (17.0-30.0 GHz). More FSS networks are under construction and are expected to be launched over the coming years. Ka-band satellites typically use small spot beams, which leads to increased efficiency of spectrum usage and allows for small user terminal antennas. Also, the increased efficiency allows for broadband communications at costs lower than those available by using typical Ku-band systems.

The ECC has adopted several Decisions related to the operation of FSS systems in the Ka-band, in particular ECC/DEC/(05)01, ECC/DEC/(05)08, ECC/DEC/(06)02 and ECC/DEC/(06)03.

Work has been conducted within the ITU-R to examine the issues related to the operation of ESOMPs in Ka-band FSS networks. Report ITU-R S.2223 identifies technical and regulatory issues to be considered in regulations for ESOMPs. In ECC Report 184, the CEPT has studied the technical and regulatory requirements related to the operation of ESOMPs and determined technical limits required for ESOMP operations. These technical conditions would ensure that FSS networks and terrestrial services do not suffer from harmful interference from ESOMPs, especially as ESOMPs, when operating within the national territory of CEPT countries, are expected to transmit only in bands identified for uncoordinated FSS earth stations as per ECC/DEC/(05)01 and ECC/DEC/(05)08.

Operating on moving platforms, ESOMPs have the potential of causing harmful interference to other satellite networks, due to the possible mis-pointing of the terminal antenna to the intended satellite. However, advances in technology, particularly the development of stabilised earth station antennas, have allowed the development of mobile earth stations with very stable pointing characteristics, capable of maintaining a high degree of pointing accuracy even on rapidly moving platforms. “Closed-loop tracking” and an automatic capability of muting transmission if mis-pointing towards the intended space station occurs or is about to happen, can ensure that ESOMPs do not represent more risk than typical uncoordinated FSS earth stations, which are often deployed without satellite-tracking capabilities. Furthermore, it should be ensured that the aggregate interference caused to other satellite networks by ESOMPs would be no higher than the limits agreed in coordination between the relevant satellite networks. To meet these requirements, ESOMPs are required through this Decision to be permanently connected to a Network Control Facility (NCF). When properly managed and controlled by the NCF, the technical characteristics of these mobile earth stations are then indistinguishable from typical uncoordinated FSS earth stations in fixed locations from the perspective of inter-satellite network interference.

ECC/DEC/(05)01 designates different parts of the 27.5-29.5 GHz band for the use of Fixed Service (FS) and uncoordinated transmit FSS earth stations. The intention of this Decision is to provide technical conditions to allow ESOMPs to operate in the parts of the range 27.5-29.5 GHz available for uncoordinated FSS earth stations, and in the band 29.5-30.0 GHz. Although the frequency arrangements in the range 27.5-29.5 GHz are well harmonised in CEPT through Decision ECC/DEC/(05)01, there may be cases where a band available for uncoordinated FSS in one country is used for FS systems in a neighbouring country. This could occur, for example, in the band 28.8365-28.9485 GHz, which is designated for uncoordinated FSS earth stations, but is also used for terrestrial services in some CEPT countries.

In addition, ECC/DEC/(05)08 identifies certain frequency bands for uncoordinated FSS earth stations, including the band 29.5-30 GHz in the Earth-to-space direction, with exemption from individual licensing provided through Decisions ECC/DEC/(06)02 and ECC/DEC/(06)03.

In the case of land based ESOMPs operating in the bands available for uncoordinated FSS earth stations, there is no change to the current interference environment since ESOMPs may operate in any location, just like uncoordinated FSS earth stations.

In the case of ESOMPs mounted on aircraft, regulatory provisions are required, since the geometry of the interference environment is different. An ESOMP mounted on an aircraft and operating in the territory of one country could cause interference to terrestrial systems operating in a neighbouring country even when the separation distance is significantly larger than would be the case for an uncoordinated FSS earth station on land. Consequently, this Decision introduces Power Flux Density (PFD) thresholds for ESOMPs mounted on aircraft that apply to the territory of administrations which operate terrestrial systems in the same bands as those used by the aircraft-mounted ESOMPs. This constraint may be relaxed with the agreement of the administrations concerned, for example if the terrestrial system characteristics differ from those used in the calculation of the PFD threshold or if the terrestrial systems are deployed only in parts of the country distant from the aircraft route.

In addition, in the case of ESOMPs mounted on vessels, the interference environment is also different to that for land based ESOMPs in some respects. In particular, ESOMPs on vessels could operate in international waters (typically beyond 12 nautical miles from the low-water mark of any country). Hence, it is necessary to ensure that terrestrial systems deployed in the band 27.5-29.5 GHz are also adequately protected from interference from these terminals. Consequently, this Decision applies a PFD threshold to ESOMPs on vessels. This threshold applies at the low-water mark of any affected country in any part of the band 27.5-29.5 GHz designated for use by terrestrial systems in that country. The PFD constraint may be relaxed with the agreement of the administrations concerned for reasons similar to those for the case of aircraft-mounted ESOMPs.

To comply with the PFD values applicable to ESOMPs on aircraft and vessels, any ESOMP operating in the range 27.5-29.5 GHz must monitor its location and have knowledge of, and control over, other characteristics such as equivalent isotropically radiated power (e.i.r.p.) and antenna pointing direction. This function may be accomplished by the ESOMP NCF, which shall have the possibility of reducing the terminal e.i.r.p., or even ceasing transmission. This Decision places requirements on the ESOMP NCF to give confidence that the requirements listed in Annex 2 will be met.

### **3 REQUIREMENT FOR AN ECC DECISION**

ESOMP systems are planned to be deployed in Europe from early 2013.

As ESOMPs are generally intended to be used while in motion and move from one country to another, a Decision is required to ensure that ESOMPs comply with the necessary technical requirements and to provide for the harmonised use, exemption from individual licensing and free circulation of these terminals in CEPT.

**ECC DECISION OF 8 MARCH 2013 ON THE HARMONISED USE, FREE CIRCULATION AND EXEMPTION FROM INDIVIDUAL LICENSING OF EARTH STATIONS ON MOBILE PLATFORMS (ESOMPS) WITHIN THE FREQUENCY BANDS 17.3-20.2 GHz AND 27.5-30.0 GHz (ECC/DEC/(13)01)**

“The European Conference of Postal and Telecommunications Administrations,

*considering*

- a) that, the introduction of new ESOMP systems will enhance broadband communications over wide territories in the CEPT, making them available on platforms such as aircraft, ships and ground vehicles;
- b) that, administrations should work towards the exemption of relevant radio equipment from individual licensing based on harmonised criteria detailed in ERC/REC 01-07;
- c) that, in the ITU Radio Regulations (ITU RR), the band 17.3-17.7 GHz is globally allocated to the Fixed Satellite Service (FSS) (Earth-to-space) on a primary basis limited to feeder links for the BSS and is subject to ITU RR Appendix 30A and is also allocated on a primary basis in Region 1 to the FSS (space-to-Earth);
- d) that, the band 17.7-19.7 GHz is globally allocated to both the Fixed Service (FS) and the FSS (space-to-Earth), among other services, on a primary basis in the ITU RR;
- e) that, the band 27.5-29.5 GHz is globally allocated to the FS, the Mobile Service (MS), and the FSS (Earth-to-space) on a primary basis in the ITU RR;
- f) that, the band 29.5-30.0 GHz is globally allocated to the FSS (Earth-to-space) and the band 19.7-20.2 GHz is globally allocated to the FSS (space-to-Earth) on a primary basis in the ITU RR;
- g) that, Decision ECC/DEC/(05)01 designates certain frequency bands in the range 27.5-29.5 GHz for the use of uncoordinated FSS earth stations and certain others for the use of the FS;
- h) that, Decision ECC/DEC/(05)01 also designates the band 28.8365-28.9485 GHz for the use of uncoordinated FSS earth stations, without prejudice to the FS systems licensed in this band in some countries before 18 March 2005;
- i) that, the Office collects information regarding, in particular, the usage of FS applications in the CEPT in the frequency bands within the ranges 17.7-19.7 GHz and 27.5-29.5 GHz and that this information is publicly available in the ECO Frequency Information System (EFIS);
- j) that, Report ITU-R S.2223 identifies the technical and operational requirements for the operation of ESOMPs in Ka-band FSS networks and that ECC Report 184 identifies certain technical conditions for ESOMPs to ensure that they do not cause unacceptable interference to other services;
- k) that, ECC/DEC/(05)08 decides that certain frequency bands in the range 17.3-30.0 GHz are available for high density applications in the FSS, including uncoordinated FSS earth stations;
- l) that, ECC/DEC/(05)10 and ECC/DEC/(05)11 have established regulatory requirements allowing for the free circulation and use of aircraft earth stations and earth stations on vessels in the 14.0-14.5 GHz band;
- m) that, ECC/DEC/(06)02 and ECC/DEC(06)/03 have been developed to provide exemption from individual licensing of LESTs and HESTs in the bands 19.7-20.2 GHz and 29.5-30 GHz;
- n) that, some of the technical characteristics of the ESOMP systems are influenced by the technical co-ordination conditions of the relevant satellite networks;
- o) that, the use of ESOMPs on ships and aircraft requires authorisation by the relevant national Administration of the country where the ship or aircraft is registered;

- p) that, some administrations may require a frequency authorisation due to specific national requirements, while other administrations may require some form of notification, exemption, or mutual recognition of the licence issued in the country of registration of the terminal;
- q) that, when operating in the national territory of a CEPT Administration, relevant national regulatory requirements may apply to ESOMPs;
- r) that, in EU/EFTA countries the radio equipment that is under the scope of this Decision shall comply with the R&TTE Directive. Conformity with the essential requirements of the R&TTE Directive may be demonstrated by compliance with the applicable harmonised European standard(s) or by using the other conformity assessment procedures set out in the R&TTE Directive;
- s) that ETSI has published the European harmonised standard EN 303 978 for ESOMPs ;

### *DECIDES*

1. that the **purpose of this ECC Decision** is to:
  - a. harmonise the use and allow the free circulation and exemption from individual licensing of ESOMPs of geostationary satellite networks operating within the frequency bands 17.3-20.2 GHz (receive band) and 27.5-30 GHz (transmit band);
  - b. apply the technical conditions necessary to ensure harmful interference is not caused by ESOMPs to stations of the FSS, FS and other services;
2. that CEPT **administrations shall**:
  - a. Designate the frequency bands 19.7-20.2 GHz (space-to-Earth) and 29.5-30 GHz (Earth-to-space) for the operation of ESOMPs;
  - b. Designate the frequency bands 17.3-19.7 GHz (space-to-Earth), 27.5-27.8285 GHz (Earth-to-space), 28.4445-28.8365 GHz (Earth-to-space), and 29.4525-29.5 GHz (Earth-to-space) for the operation of ESOMPs;
  - c. Designate the band 28.8365-28.9485 GHz (Earth-to-space) for the operation of ESOMPs, in those countries that have not authorised terrestrial systems in this band;
  - d. Inform the Office, through the ECO Frequency Information System (EFIS), whether frequencies within 28.8365-28.9485 GHz are designated for ESOMP operations, or not, within their territory;
  - e. Inform the Office of the necessity for ESOMPs operating on the Earth surface in the vicinity of airfields to be coordinated (see also Annex 3);
  - f. Allow the free circulation and use of ESOMPs that satisfy the provisions of this Decision;
  - g. Exempt ESOMPs from individual licensing;
3. that, for the purpose of this ECC Decision, the **following technical and operational parameters** apply:
  - a. Within the frequency bands 17.3-20.2 GHz and 27.5-30.0 GHz, ESOMPs shall operate only in the portions of these frequency bands identified for their use within the territory of operation;
  - b. ESOMPs operating in international waters or international airspace (which may transmit within the range 27.5-30.0 GHz), shall ensure protection of fixed service systems in the CEPT;
  - c. ESOMPs transmitting in the band 29.5-30.0 GHz shall comply with the requirements in Annex 1;
  - d. ESOMPs transmitting in the band 27.5-29.5 GHz shall comply with the requirements in Annexes 1, 2 and 4;

- e. In countries where coordination in the vicinity of airfields is needed, then the requirements in Annex 3 shall apply;
  - f. ESOMPs receiving in the band 17.7-19.7 GHz shall not claim protection from interference from fixed stations operating in the same band and in conformity with their national regulations;
  - g. ESOMPs receiving in the band 17.3-17.7 GHz shall not claim protection from BSS feeder links operating in the same band and in conformity with their national regulations;
4. that this Decision **enters into force** on 8 March 2013;
  5. that the preferred **date for implementation** of this Decision shall be 31 May 2013;
  6. that CEPT administrations shall communicate the **national measures** implementing this Decision to the ECC Chairman and the Office when this ECC Decision is nationally implemented.”

*Note:*

*Please check the Office documentation database <http://www.ecodocdb.dk> for the up to date position on the implementation of this and other ECC Decisions.*

**ANNEX 1: TECHNICAL AND OPERATIONAL REQUIREMENTS FOR ESOMPS OPERATING WITHIN THE FREQUENCY BANDS 17.3-20.2 GHz AND 27.5-30 GHz**

ESOMPs operating within the frequency bands 17.3-20.2 GHz and 27.5-30.0 GHz shall comply with the following technical and operational requirements:

1. This decision applies to ESOMPs operating in a geostationary satellite network;
2. ESOMP networks shall operate under the control of a Network Control Facility (NCF);
3. In order to protect other satellite networks and systems, ESOMP networks shall be operated in such a manner that the aggregate off-axis e.i.r.p. levels produced by all co-frequency earth stations of each network are not greater than the levels that have been coordinated for the typical earth station(s) pertaining to fixed-satellite service networks where FSS transponders are used;
4. The design, coordination and operation of ESOMPs shall, at least, account for the following factors which could vary the aggregate off-axis e.i.r.p. levels generated by:
  - a. antenna mis-pointing;
  - b. variations in the antenna pattern;
  - c. variations in the transmit e.i.r.p..
5. ESOMPs that use closed-loop tracking of the satellite signal shall employ an algorithm that is resistant to capturing and tracking adjacent satellite signals. ESOMPs shall immediately inhibit transmissions when they detect that unintended satellite tracking has happened or is about to happen;
6. ESOMPs shall be self-monitoring and should a fault which can cause harmful interference to FSS or terrestrial networks be detected, the ESOMP must automatically cease its transmissions;
7. ESOMPs shall be in conformance with the Harmonised European Standard EN 303 978, "Satellite Earth Stations and Systems (SES); Harmonised EN for Earth Stations on Mobile Platforms (ESOMP) transmitting towards satellites in geostationary orbit in the 27.5 GHz to 30.0 GHz frequency bands covering essential requirements under article 3.2 of the R&TTE Directive", which may also be demonstrated by compliance with equivalent technical specifications (in the sense of art. 3(2) of the R&TTE Directive);
8. The maximum e.i.r.p. of ESOMP equipment shall be limited to a value within the range from 55 to 60 dBW.

## ANNEX 2: ADDITIONAL TECHNICAL AND OPERATIONAL REQUIREMENTS FOR ESOMPS OPERATING WITHIN THE FREQUENCY BANDS 17.3-19.7 GHz AND 27.5-29.5 GHz

ESOMPs operating within the frequency bands 17.3-19.7 GHz and 27.5-29.5 GHz must comply (in addition to Annex 1) with the following technical and operational requirements:

1. In the territory of any administration, the off-axis<sup>1</sup> e.i.r.p. spectral density radiated by any ESOMP into the FS bands (i.e. 27.8285-28.4445 GHz, 28.8365-28.9485 GHz (where applicable) and 28.9485-29.4525 GHz) shall be limited to -35 dBW/MHz. This limit shall, in any case, be met by ESOMPs on land, on territorial sea or on internal waters, at a direction of 3 degrees or less above the local horizontal plane at the ESOMP terminal;
2. In the territory of any administration, ESOMPs shall not have their transmit occupied band edges closer than 10 MHz from the edges of the bands identified by that administration for FS operation;
3. The antenna elevation angle shall be higher than 3 degrees;
4. In the band 28.8365-28.9485 GHz, the PFD threshold values in paragraphs 6 and 7 shall apply to the territory of any administration which authorises FS systems in this band and shall not be exceeded, unless prior agreement has been given by the concerned administration(s) to exceed these values;
5. In the bands 27.8285-28.4445 GHz and 28.9485-29.4525 GHz, the PFD threshold values in paragraphs 6 and 7 shall apply to the territory of all CEPT administrations and shall not be exceeded, unless prior agreement has been given by the concerned administration(s) to exceed these values;
6. For ESOMPs installed on aircraft the PFD values (dB(W/m<sup>2</sup>) in a reference bandwidth of 14 MHz) on the ground are the following:

-124.7	for	0°	≤ δ ≤	0.01°
-120.9 + 1.9 log <sub>10</sub> (δ)	for	0.01°	< δ ≤	0.3°
-116.2 + 11.0 log <sub>10</sub> (δ)	for	0.3°	< δ ≤	1.0°
-116.2 + 18.0 log <sub>10</sub> (δ)	for	1.0°	< δ ≤	2.0°
-117.9 + 23.7 log <sub>10</sub> (δ)	for	2.0°	< δ ≤	8.0°
-96.5	for	8.0°	< δ ≤	90.0°

where δ is the angle of arrival at the Earth's surface (degrees).

The PFD values above are not defined as under "free-space" conditions. Hence, when assessing ESOMP compliance with this PFD mask, atmospheric absorption and any attenuation due to the aircraft fuselage shall be taken into account<sup>2</sup>;

7. For ESOMPs installed on vessels, the PFD threshold value is -109 dB(W/m<sup>2</sup>) in a reference bandwidth of 14 MHz at a height of 20 metres above mean sea level at the low-water mark of the territory of the administrations defined in paragraphs 4 and 5 above<sup>3</sup>;
8. For ensuring compliance with the above PFD provisions ESOMPs shall have self-monitoring functions and automatic mechanisms (locally, or under the control of the NCF) to reduce its e.i.r.p. or cease transmissions;
9. National limitations applicable to uncoordinated FSS earth stations to avoid cross-border interference to fixed or mobile services in the same band in an adjacent country shall apply to land based ESOMPs and ESOMPs operating on territorial sea and on inland waterways in the same country as the uncoordinated FSS earth stations;

<sup>1</sup>Off-axis refers to angles greater than 7° from the axis of the main beam or to angles greater than the declared minimum elevation angle of the ESOMP, whichever is lower.

<sup>2</sup>The baseline assumptions of these losses are given in ECC Report 184 Annex 1.

<sup>3</sup>The PFD values above are not defined as under "free-space" conditions. The percentage of time that should be used in the propagation model when assessing compliance with this PFD threshold should be 0.007%.



### ANNEX 3: PROTECTION OF AIRCRAFT FROM ESOMPS OPERATING ON THE EARTH SURFACE IN THE VICINITY OF AN AIRFIELD

The following requirements are based on ECC Report 066, using a maximum EMC field strength of 20 V/m. The coordination zone comprises the area within the airfield boundary fence in addition to an area surrounding the boundary fence, the width of which depends on the e.i.r.p., see the Table 1 below.

**Table 1: Coordination zones**

<b>ES_e.i.r.p. range</b>	34.0 dBW to 50.0 dBW	> 50.0 dBW to 55.3 dBW	>55.3 dBW to 57.0 dBW	>57.0 dBW to 60.0 dBW
<b>ES_latitude</b>	<b>From boundary</b>	<b>From boundary</b>	<b>From boundary</b>	<b>From boundary</b>
>35-70°/N	500 m	1800 m	2300 m	3500 m
30-35°/N	600 m	2000 m	2600 m	3900 m

**ANNEX 4: INFORMATION AND DECLARATION TO BE SUBMITTED BY ESOMP OPERATORS TO THE OFFICE**

Any ESOMP operator intending to operate ESOMPs within the framework of this ECC Decision is required to submit to the Office (<http://www.cept.org/eco>) a declaration that their system complies with the requirements of this Decision and the information (with any subsequent changes) contained in Table 2 below.

**Table 2: Information to be provided by ESOMP Operators**

Information	To be filled in
Network operator name	
Network operator address	
Network Control Facility (NCF) designated point of contact <ul style="list-style-type: none"> <li>- Contact name</li> <li>- Contact telephone number</li> <li>- Contact email address</li> </ul>	

## ANNEX 5: ANNEX 5: LIST OF REFERENCES

This annex contains the list of relevant reference documents.

- [1] ECC/DEC/(05)01 on the use of the band 27.5-29.5 GHz by the Fixed Service and uncoordinated Earth stations of the Fixed-Satellite Service (Earth-to-space);
- [2] ECC/DEC/(05)08 on the availability of frequency bands for high density applications in the Fixed-Satellite Service (space-to-Earth and Earth-to-space);
- [3] ECC/DEC/(06)02 on Exemption from Individual Licensing of Low e.i.r.p. Satellite Terminals (LEST) operating within the frequency bands 10.70-12.75 GHz or 19.70-20.20 GHz space-to-Earth and 14.00-14.25 GHz or 29.50-30.00 GHz Earth-to-space;
- [4] ECC/DEC/(06)03 on Exemption from Individual Licensing of High e.i.r.p. Satellite Terminals (HEST) with e.i.r.p. above 34 dBW operating within the frequency bands 10.70-12.75 GHz or 19.70-20.20 GHz space-to-Earth and 14.00-14.25 GHz or 29.50-30.00 GHz Earth-to-space;
- [5] ERC/REC 01-07 on Harmonised regime for exemption from individual licensing for the use of radio spectrum;
- [6] ECC/DEC/(05)10 on the free circulation and use of Earth Stations on board Vessels operating in fixed satellite service networks in the frequency bands 14-14.5 GHz (Earth-to-space), 10.7-11.7 GHz (space-to-Earth) and 12.5-12.75 GHz (space-to-Earth);
- [7] ECC/DEC/(05)11 on the free circulation and use of Aircraft Earth Stations (AES) in the frequency bands 14-14.5 GHz (Earth-to-space), 10.7-11.7 GHz (space-to-Earth) and 12.5-12.75 GHz (space-to-Earth);
- [8] ETSI EN 303 978 Satellite Earth Stations and Systems (SES); Harmonised European Standard for Earth Stations On Mobile Platforms (ESOMP) transmitting towards satellites in geostationary orbit in the 27.5 GHz to 30.0 GHz frequency bands covering essential requirements under article 3.2 of the R&TTE Directive;
- [9] ECC Report 066 on Protection of aircraft from satellite earth stations operating on the ground in the vicinity of airfields;
- [10] ECC Report 184 on the use of earth stations on mobile platforms operating with GSO satellite networks in the frequency range 17.3-20.2 GHz and 27.5 – 30.0 GHz;
- [11] Report ITU-R S.2223 on technical and operational requirements for GSO FSS earth stations on mobile platforms in bands from 17.3 to 30.0 GHz.