



ECC Decision (18)05

The harmonised use, exemption from individual licensing and free circulation and use of Earth Stations In-Motion (ESIM) operating with NGSO FSS satellite systems in the frequency bands 10.7-12.75 GHz and 14.0-14.5 GHz

Approved 06 July 2018

EXPLANATORY MEMORANDUM

1 INTRODUCTION

This ECC Decision addresses the harmonised use of frequency bands 10.7-12.75 GHz (space-to-Earth) and 14.0-14.5 GHz (Earth-to-space), allocated to the fixed-satellite service (FSS), for earth stations in-motion (ESIM) operating with non-geostationary (NGSO) satellite systems, their exemption from individual licensing, and free circulation and use. ESIM considered in the Decision are to be deployed for land, maritime and aeronautical applications. These NGSO systems provide a range of communications services with the main provision being broadband communication services. These earth stations are in motion with antennas that track continuously the satellites in non-geostationary orbits.

The regulatory framework presented in this ECC Decision is based on the findings on regulatory conditions for authorising Ku-band NGSO ESIM given in ECC Report 279 [1]. The technical studies that supported the ECC Report 279 are presented in ECC Report 271 [2]. ECC Report 279 specified the regulatory conditions for authorising ESIM with the proviso that deployment of ESIM should not cause interference to other authorised services, identified as the fixed service in the band 14.25-14.5 GHz, and the radio astronomy service in the band 14.47-14.5 GHz. The CEPT also considered that protection should be offered to radio astronomy and earth exploration satellite services operating in the band 10.6-10.7 GHz from out of band emissions from NGSO satellite transmissions in the 10.7-12.5 GHz band.

Licensing is an appropriate tool for administrations to regulate the effective use of the frequency spectrum and to avoid harmful interference. However, conditions for such licensing imposed by administrations for the purpose of managing spectrum need to be proportionate. When there is no risk of harmful interference to other authorised services administrations have the option to consider general authorisation or exemption from individual licensing. The free circulation and use could be offered to radio equipment that is designed to roam within the CEPT. Administrations and especially users, retailers and manufacturers will benefit from a more harmonised system of authorising the use of radio equipment, such as exemption from individual licensing, and free circulation and use. This Decision, based on the above principles, provides the regulatory framework for exemption from individual licensing, and free circulation and use of ESIM operating to Ku-band NGSO FSS satellite systems.

2 BACKGROUND

Over the years, the CEPT developed several regulatory measures (i.e. ECC Decisions) to facilitate the exemption from individual licensing and free circulation and use of satellite ESIM (ESIM were known as ESOMP - Earth Station On Mobile Platforms - the term ESIM was adopted at the WRC-15). ESIM, as a part of a satellite system, are generally designed to operate without causing any harmful interference to other authorised services. This is achieved partly by having transmissions of ESIM always under the control of the satellite network. Recently adopted ECC Decision (17)04 [3] on Ku-band NGSO fixed earth stations also established harmonised regulatory frameworks for exemption from individual licensing and free circulation and use of NGSO fixed earth stations. Additionally, adopted ECC Decisions, ECC Decision (13)01 [4] on Ka-band GSO ESOMP and ECC Decision (15)04 [5] on Ka-band NGSO ESOMP, established harmonised regulatory frameworks for exemption from individual licensing, and free circulation and use of GSO and NGSO ESOMP, respectively.

The regulatory frameworks established by the CEPT for earth stations were underpinned by the legal framework established by the European Union for licensing. The Article 5 of the Authorisation Directive (Directive 2002/20/EC) [6] requires the use of spectrum to be facilitated under general authorisations, where, amongst other things, the risk of harmful interference to other radio services is negligible. The Radio Equipment Directive (2014/53/EU) [7] (which superseded the Radio and Telecommunication Terminal Equipment (R&TTE) Directive (1999/5/EC) [8]) ensures a Single Market for radio equipment by setting essential requirements for safety and health, electromagnetic compatibility, and the efficient use of the radio spectrum. The Radio Equipment Directive applies to all products using the radio frequency spectrum. With the implementation of the Authorisation Directive and the Radio Equipment Directive, administrations have exempted much radio equipment from individual licensing, including satellite terminals. In addition, The ERC

Recommendation 01-07[9], adopted in 1995 and revised in 2004, recommended the harmonised criteria for exempting radio equipment from individual licensing.

The provision of Pan European services to mobile radio equipment will be greatly assisted when all CEPT administrations exempt the same categories of radio equipment from individual licensing and facilitate their free circulation and use based on harmonised regulatory conditions. These conditions should only relate to measures that may be needed to mitigate any harmful interference to other authorised services.

Some CEPT administrations license on an individual basis the radio equipment on board ships and aircrafts which are registered in their country. This requirement may be extended to ESIM on board a ship or an aircraft. This Decision recognises the right of administrations to licence ESIM on board ships and aircrafts on an individual basis or exempt them from requiring individual licences.

The band 14-14.5 GHz band is allocated on a worldwide and primary basis to the FSS (Earth-to-space) in the ITU Radio Regulations and is generally available for satellite services within the CEPT and elsewhere. The band 14.25-14.5 GHz band is used for fixed links in the fixed service by a small number of administrations in the CEPT. Radio astronomy observations are carried out in the band 14.47-14.5 GHz, under an allocation made on a secondary basis in the Radio Regulations [10], at a limited number of observatories in Europe.

ERC Recommendation 13-03 [11] on the use of the band 14.0-14.5 GHz for VSAT and Satellite News Gathering recommended that the use of the band 14.25-14.5 GHz for the fixed service should be discouraged in those countries that have not already implemented fixed radio links in the band. In addition, the Recommendation said that flexible and unrestricted use of VSAT and SNG applications in the band 14.25-14.5 GHz should be allowed at least in those countries where no fixed links have been implemented so far. Subsequently, the ECC Decision (03)04 [12] was adopted and it provided conditions for licence exemption of VSAT operating in the 14.25-14.5 GHz with e.i.r.p. of no more than 50 dBW.

Exemption from individual licensing and free circulation and use

The ERC Recommendation 01-07 (revised in the year 2004) [9], recommended the harmonised criteria for exempting radio equipment from requiring individual licence, recognising that administrations and especially users, retailers and manufacturers will benefit from a more harmonised system of licensing. The ECC Decision (12)01 [13] on the exemption from individual licensing and free circulation and use of terrestrial and satellite mobile terminals, stipulated that such terminals should be under the control of terrestrial or satellite networks. The Decision stated “when the efficient use of the frequency spectrum is not at risk and as long as harmful interference is unlikely, the installation and use of radio equipment should be exempted from individual licensing.” ECC Decision (amended in the year 2016) also clarified the regulatory position “free circulation and use” as free circulation with permission to use the radio equipment. ECC Decision (12)01 applied to a limited number of satellite terminals and it did not apply to satellite terminals installed permanently on maritime vessels or aircraft.

This ECC Decision addresses the harmonised use, exemption from individual licensing and free circulation and use of ESIM operating NGSO FSS satellite systems in the 10.7-12.75 GHz (space-to-Earth) and 14.0-14.5 GHz (Earth-to-space) bands. ESIM will have access to the whole of the band 14-14.5 GHz without constraints in most CEPT administrations, except for a few where there are deployments of the fixed service (FS) in the 14.25-14.5 GHz band, and radio astronomy service (RAS) in the 14.47-14.5 GHz band. The regulatory framework established under ECC Report 279 [1] to support the deployment of NGSO ESIM takes into account other authorised services (namely FS and RAS) and the need to maintain compatibility with those services.

In those administrations with FS and RAS deployments, ECC Report 279 states that land and maritime ESIM should be provided with exemption from individual licensing and free circulation and use within the 14-14.5 GHz band provided that land and maritime ESIM maintain the required compatibility by ceasing transmissions in the frequency bands that overlap the frequency assignments of FS and/or RAS stations when these ESIM enter or located within the zones identified for the protection of FS and/or RAS stations (“protection zones”). ECC Report 279 also records that such measures are implemented by the satellite system without the involvement of individual user of the land and maritime ESIM.

As for the aeronautical ESIM, ECC Report 279 states that they should be provided with necessary authorisation and free circulation and use subject to such ESIM to maintain compatibility with the FS and RAS. This compatibility is achieved by meeting Power Flux Density (PFD) levels on earth determined for the protection of FS and RAS stations and stated in ECC Report 271 [2]. ECC Report 271 notes that the aeronautical ESIM will comply with the PFD level specified for the protection of FS, whereas for the protection of RAS the aeronautical ESIM will have to cease transmissions in the 14.47-14.5 GHz when the RAS station carrying out observations is visible. This is because the PFD level required to protect RAS is at such a low level it cannot be met by the aeronautical ESIM.

The above places certain obligations on satellite operators if ESIM (land, maritime and aeronautical) are to be deployed in administrations that have deployed FS in the 14.25-14.5 GHz band and RAS in the 14.47-14.5 GHz band. In such cases that satellite network operator, intending to benefit from this ECC Decision, will have an obligation to declare that:

1. it has identified the protection zones for the FS and/or RAS stations of CEPT administrations, within which it intends to deploy ESIM operating in the 14.25-14.5 GHz band, in consultation with the administrations concerned;
2. its satellite system shall provide for the cessation of transmissions, to maintain compatibility with FS and/or RAS, as specified by the harmonised standard EN 303 980 [14];
3. It has noted the conditions for the protection requirements of FS and RAS stations from aeronautical ESIM and employed such conditions within its satellite system.

The template for the declaration can be found in Annex 2 to this Decision.

High Intensity Radiated Field Protection of aircraft

The ECC Report 272 on "earth stations operating in the frequency bands 4-8 GHz, 12-18 GHz and 18-40 GHz in the vicinity of aircraft" [15] assessed the protection of aircraft from ESIM. It stated that there would be no additional constraint imposed on land, maritime or airborne ESIM operating with e.i.r.p. lower than 54.5 dBW in the Ku-band. The e.i.r.p. of NGSO earth stations documented in the ECC Report 271 is 34 dBW, 20 dB below the e.i.r.p. limit. Therefore there should be no restriction on the operation of land, maritime or airborne ESIM, operating with e.i.r.p. up to 54.5 dBW, within or in the vicinity of airfields.

Protection of Ku-band GSO FSS satellite networks

The protection of geostationary satellites networks in the fixed-satellite service and the broadcasting satellite service from unacceptable interference caused by Ku-band NGSO satellite systems is ensured via the applicable provisions of the ITU Radio Regulations [10], in particular Article 22.2, 22.5C to 22.5I and Resolution 85.

Protection of RAS and EESS (passive) in the adjacent band 10.6-10.7 GHz

The management of interference and aggregate effects from NGSO and GSO systems to the RAS and EESS (passive) in the 10.6-10.7 GHz band is achieved by satellite system-specific measures, limiting unwanted emissions in the band 10.6-10.7 GHz, including for NGSO systems suppression of satellite transmissions in the channel immediately adjacent to 10.7 GHz or other measures in vicinity of RAS and EESS (passive) stations (see ECC Report 271 [2]).

3 REQUIREMENT FOR AN ECC DECISION

Earth stations in-motion operating with NGSO FSS satellite systems in the frequency band 10.7-12.75 GHz (space-to-Earth) and 14.0-14.5 GHz (Earth-to-space) are being planned for deployment in Europe, as a part of worldwide deployment of broadband services. Such systems are needed especially to address the broadband requirements of rural and remote areas. An ECC Decision is required to ensure that the authorisation of terminals within the CEPT will be subject to harmonised conditions, such as those stipulated in this ECC Decision.

ERC Recommendation 01-07 [9], adopted in 1995, lists harmonised criteria for administrations to decide whether an exemption from individual licence should be applied. This Decision, prepared within the aim of exempting from individual licensing of ESIM operating with NGSO FSS satellite systems in the frequency band 14.0-14.5 GHz from individual licensing, fulfils the criteria for exemption listed in ERC Recommendation 01-07.

ECC DECISION OF 06 JULY 2018 ON THE HARMONISED USE, EXEMPTION FROM INDIVIDUAL LICENSING AND FREE CIRCULATION AND USE OF EARTH STATIONS IN-MOTION (ESIM) OPERATING WITH NGSO FSS SATELLITE SYSTEMS IN THE FREQUENCY BANDS 10.7-12.75 GHZ AND 14.0-14.5 GHZ (ECC/DEC(18)05)

“The European Conference of Postal and Telecommunications Administrations,

considering

- a) that within the CEPT administrations there is an ongoing awareness of a need for harmonisation of licensing regimes in order to facilitate the provision of Pan European services;
- b) that the introduction of new NGSO satellite systems in the 10.7-12.75 GHz (space-to-Earth) and 14.0-14.5 GHz (Earth-to-space) bands will enhance broadband communications over all the territories in the CEPT;
- c) that the band 14-14.25 GHz is allocated on a worldwide and primary basis to the fixed-satellite service (Earth-to-space) in the ITU Radio Regulations [10];
- d) that the band 14.25-14.5 GHz is allocated on a worldwide and primary basis to the fixed-satellite service (Earth-to-space) amongst other services in the ITU Radio Regulations [10];
- e) that the band 14-14.3 GHz is allocated on a worldwide and primary basis to the radionavigation service in the ITU Radio Regulations [10] and currently not utilised by the CEPT;
- f) that the band 14.3-14.4 GHz in Region 1, 14.4-14.5 GHz on a worldwide basis and 14.25-14.3 GHz in some countries (through RR footnote 5.508 [10]) are allocated to the fixed service on a primary basis, and the deployment of fixed service stations is limited to a few CEPT administrations;
- g) that the frequency band 10.68-10.7 GHz is allocated on a worldwide and primary basis to the earth-exploration-satellite service (passive), the radio astronomy service and the space research service (passive) (see also Radio Regulations No 5.340 [10]);
- h) that the frequency band 10.6-10.68 GHz is allocated on a worldwide and primary basis to the Earth-exploration satellite service (passive), the radio astronomy service and the space research service (passive);
- i) that in the frequency band 10.7-12.50 GHz, fixed service systems are being operated on a shared basis;
- j) that ERC Decision (00)08 [16] establishes the priority between fixed service and uncoordinated earth stations in the fixed-satellite service and the broadcasting satellite service in the band 10.7-12.50 GHz including that CEPT administrations shall not deploy new fixed service systems in the band 11.7-12.5 GHz (also recognised by footnote ECA 28 in the European Common Allocation Table – ERC Report 25 [17]);
- k) that Radio Regulations No. 5.492 [10] addresses the use of broadcasting-satellite service assignments by the fixed-satellite service (space-to-Earth) in the band 11.7-12.5 GHz;
- l) that Radio Regulations No. 5.149 [10] urges administrations in making assignments to stations of other services in the band 14.47-14.5 GHz, which is also allocated radio astronomy service on a secondary basis, to take all practicable steps to protect the radio astronomy service from harmful interference;
- m) that the deployments of ESIM operating with NGSO FSS satellite systems in the frequency bands 10.7-12.75 GHz and 14.0-14.5 GHz installed on land vehicle, ship or an aircraft need to maintain compatibility with other services mentioned in considerations e), f), g), h), i), k) and l);

- n) that Radio Regulations No. 22.2 [10] addresses the protection of geostationary-satellite networks in the fixed-satellite service and the broadcasting-satellite service;
- o) that ECC Decision (06)02 [18] and ECC Decision (06)03 [19] provide criteria, respectively, for licence exemption of low e.i.r.p. (not greater than 34 dBW) and high e.i.r.p. (between 34 and 60 dBW) satellite terminals operating in the 14-14.25 GHz subject to the conditions stipulated in the said ECC Decisions;
- p) that ECC Decision(03)04 [12] provides criteria for licence exemption of VSAT operating in the 14.25-14.5 GHz with e.i.r.p. of not greater than 50 dBW subject to the conditions stipulated in the said ECC Decision;
- q) that the ERC Recommendation 01-07 [9], adopted in 1995 and revised in 2004, recommended the harmonised criteria for exempting radio equipment from individual licensing;
- r) that the ECC adopted several Decisions, including ECC Decision (13)01 [4] on Ka-band GSO ESOMP and ECC Decision (15)04 [5] on Ka-band NGSO ESOMP, to allow earth stations in-motion to be exempted from individual licensing and to allow their free circulation and use;
- s) that the deployment of ESIM operating with NGSO FSS satellite systems in the frequency band 14.0-14.5 GHz band within a CEPT administration shall be subjected to relevant national regulatory requirements;
- t) that some CEPT administrations offer individual licences to ship and aircraft equipment based on the national regulations and/or national implementation of international regulations;
- u) that some CEPT administrations may require that operators of NGSO FSS satellite systems obtain an individual authorisation for their network due to national regulatory requirements;
- v) that those CEPT administrations which do not have fixed service stations in the band 14.25-14.5 GHz and which do not have to protect those stations in their country or in the neighbouring countries should work towards the exemption of ESIM from individual licensing based on harmonised criteria detailed in ERC Recommendation 01-07 [9];
- w) that the ECC Report 279 [1] addresses land, maritime and aeronautical ESIM and provide methodologies for the management of the compatibility between these earth stations in FSS and Fixed Service, EESS and RAS;
- x) that in ITU Region 1, the band 11.7-12.5 GHz is also allocated to the fixed-satellite service (space-to-Earth) on a primary basis, limited to non-geostationary systems according to the Radio Regulations footnote 5.487A;
- y) that in EU/EFTA countries the radio equipment that is under the scope of this Decision shall comply with the RE Directive [7]. Conformity with the essential requirements of the RE Directive may be demonstrated by compliance with the applicable harmonised European standard EN 303 980 [14] or by using the other conformity assessment procedures set out in the RE Directive.

DECIDES

1. that the **purpose of this ECC Decision** is to:
 - a) harmonise the use of the frequency bands 10.7-12.75 GHz (space-to-Earth) and 14.0-14.5 GHz (Earth-to-space) for the use of ESIM operating with NGSO FSS satellite systems;
 - b) exempt from individual licensing of ESIM and allow their free circulation and use operating with NGSO FSS satellite systems in the frequency bands 10.7-12.75 GHz (space-to-Earth) and 14.0-14.5 GHz (Earth-to-space);
 - c) establish the technical conditions necessary to ensure harmful interference is not caused by ESIMs to stations of the radio astronomy service and the fixed service;
2. that CEPT administrations shall designate frequency bands 10.7-12.75 GHz (space-to-Earth) and 14.0-14.5 GHz (Earth-to-space) for the use of ESIM operating with NGSO FSS satellite systems;
3. that CEPT administrations shall exempt ESIM from individual licensing and allow their free circulation and use provided that the ESIM:
 - a) comply with the requirements in Annex 1 and 2;
 - b) use an equivalent isotropically radiated power (e.i.r.p.) not exceeding 54.5 dBW. When an antenna is coupled to more than one transmitter or a transmitter provides more than one carrier (multi-carrier operation), the above e.i.r.p. level is the sum of all simultaneous emissions from the antenna on the main lobe;
 - c) operate on a non-protected basis with regards to the fixed service stations of the frequency band 10.7-11.7 GHz;
 - d) operate with NGSO FSS satellite systems while maintaining compatibility with other services as mentioned in considerings e), f), g), h), i), k), and l);
 - e) fulfil considering-y), without prejudice to considering u);
4. that this Decision enters into force on 06 July 2018;
5. that the preferred date for implementation of this Decision shall be 06 January 2019;
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 <https://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 EARTH STATIONS IN-MOTION OPERATING WITH NGSO FSS SATELLITE SYSTEMS IN THE FREQUENCY BANDS 10.7-12.75 GHZ AND 14.0-14.5 GHZ

ESIM operating with NGSO FSS satellite systems in the frequency bands 10.7-12.75 GHz and 14.0-14.5 GHz shall comply with the following technical and operational requirements:

1. The ESIM shall operate under the control of a Network Control Facility (NCF);
2. The design, coordination and operation of the ESIM shall take into account the following factors:
 - a) antenna mis-pointing;
 - b) variations in the antenna pattern;
 - c) variations in the transmit e.i.r.p..
3. ESIM that use closed-loop tracking of the satellite signal shall employ an algorithm that is resistant to capturing and tracking signals from nearby satellite; earth stations shall immediately cease transmissions when they detect that unintended satellite tracking has happened or is about to happen;
4. ESIM shall be in conformance with the Harmonised European Standard EN 303 980 [14];
5. In the band 14.25-14.5 GHz, the PFD threshold values in paragraphs 6, 7 and 8 shall apply to the territory of any administration which authorises FS systems in this band and shall not be exceeded;
6. For ESIM installed on aircraft the PFD values on earth are the following:
 - $-122 \text{ dB(W/(m}^2 \cdot \text{MHz))}$ for $\theta \leq 5^\circ$
 - $-127 + \theta \text{ dB(W/(m}^2 \cdot \text{MHz))}$ for $5^\circ < \theta \leq 40^\circ$
 - $-87 \text{ dB(W/(m}^2 \cdot \text{MHz))}$ for $40^\circ < \theta \leq 90^\circ$
 where θ is the angle of arrival of the radio-frequency wave (degrees above the horizontal);
7. For ESIM installed on vessels, the PFD threshold value is $-116 \text{ dBW/m}^2/\text{MHz}$ at a height of 80 metres above mean sea level at the low-water mark of the territory of the administrations in paragraph 5 above;
8. For land based ESIM, a PFD limit of $-116 \text{ dBW/m}^2/\text{MHz}$ at 30 m height above ground of the territory of the administrations in paragraph 5 above;
9. In the band 14.47-14.5 GHz, ESIM installed on aircraft are required to cease emissions when in visibility of a RAS station performing observations in this band;
10. In the band 14.47-14.5 GHz, the PFD threshold values in paragraphs 11 and 12 shall not be exceeded;
11. For ESIM installed on vessels, the PFD threshold value at the observatory of $-169 \text{ dBW/m}^2/(150 \text{ kHz})$, not to be exceeded more than 2% of the time (Ref: Recommendation ITU-R RA.769 [20]);
12. For land based ESIM, the PFD threshold value at the observatory of $-169 \text{ dBW/m}^2/(150 \text{ kHz})$, not to be exceeded more than 2% of the time (Ref: Recommendation ITU-R RA.769 [20]);
13. For ensuring compliance with the above PFD provisions ESIM 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.

ANNEX 2: INFORMATION AND DECLARATION TO BE SUBMITTED BY ESIM OPERATORS TO THE OFFICE AND INFORMATION RELATING TO FS (14.25–14.50 GHZ) AND RAS DEPLOYMENTS

A2.1 Information and declaration to be submitted by ESIM Operators

Any ESIM operator intending to operate ESIM within the framework of this ECC Decision is required to submit to the Office (<http://www.cept.org/eco>):

- a declaration that its system complies with the requirements of Annex 1 of this Decision, including compatibility with each of the services mentioned in decides 3 d),
- the information (with any subsequent changes) requested in Table 1 below.

Table 1: Information to be provided by ESIM operators

Information	To be filled in
ESIM operator	
ESIM operator contact details (address, telephone number, email)	
Network Control Facility (NCF) contact details (address, telephone number, email)	

A2.2 INFORMATION ON ADMINISTRATIONS DEPLOYING FS AND RAS STATIONS¹

Administration currently with Fixed Service deployments in the frequency band 14.25–14.50 GHz:

- France
- Germany
- Italy
- Romania
- Russian Federation
- United Kingdom

¹ Any request for update of the following lists of Administrations with FS deployments and RAS stations shall be notified to ECO and submitted to WG FM for updating the ECC Decision accordingly.

Relevant RAS stations deployed in the CEPT (Source: ECC Report 271):

Table 2: CEPT radio astronomy observatories using the band 10.6-10.7 GHz

Administration	Name	Longitude	Latitude
Belgium	Humain	05° 15' 12"	50° 11' 31"
Germany	Effelsberg	06° 53' 01"	50° 31' 29"
	Stockert	06° 43' 19"	50° 34' 10"
	Wetzell	12° 52' 38"	49° 08' 42"
Italy	Medicina	11° 38' 49"	44° 31' 15"
	Noto	14° 59' 20"	36° 52' 33"
Russian Federation	Kalyazin	37° 54' 01"	57° 13' 22"
	Puschino	37° 40' 00"	54° 49' 00"
	Badari	102° 13' 16"	51° 45' 27"
	Svetloe	29° 46' 54"	61° 05' 00"
	Zelenchukskaya	41° 35' 12"	43° 49' 34"
Portugal	Santa Maria	- 25° 07' 33"	36° 59' 07"
Spain	Yebes	- 03° 05' 18.7"	40° 31' 24.5"
Sweden	Onsala (OTT)	11° 55' 11"	57° 23' 37"
Turkey	Kayseri	35° 32' 43"	38° 42' 37"
United Kingdom	Jodrell Bank	-02° 18' 26"	53° 14' 10"-
	Cambridge	00° 02' 20"	52° 10' 00"
	Darnhall	-02° 32' 07"	53° 09' 22"
	Defford	-02° 08' 39"	52° 06' 01"
	Knockin	-02° 59' 49"	52° 47' 24"
	Pickmere	-02° 26' 38"	53° 17' 18"

Table 3: CEPT radio astronomy observatories using the band 14.47-14.5 GHz

Administration	Name	Longitude	Latitude
Germany	Effelsberg	06° 53' 01"	50° 31' 29"
Italy	Medicina	11° 38' 49"	44° 31' 15"
Russian Federation	Kalyazin	37° 40' 00"	57° 13' 22"
	Puschino	37° 40' 00"	54° 49' 00"
Portugal	Santa Maria	-25° 07' 33"	36° 59' 07"
Sweden	Onsala (OTT)	11° 55' 11"	57° 23' 37"
United Kingdom	Cambridge	00° 02' 20"	52° 10' 00"
	Jodrell Bank	-02° 18' 26"	53° 14' 10"

ANNEX 3: LIST OF REFERENCE

This annex contains the list of relevant reference documents.

- [1] ECC Report 279 – “The Use of Earth Stations in-Motion operating to NGSO Satellite Systems in the 10.7-12.75 GHz and 14-14.5 GHz band”, May 2018
- [2] ECC Report 271 – “Compatibility and sharing studies related to NGSO satellite systems operating in the FSS bands 10.7-12.75 GHz (space-to-Earth) and 14-14.5 GHz (Earth-to-space)”, January 2018
- [3] ECC Decision (17)04 – “The harmonised use and exemption from individual licensing of fixed earth stations operating with NGSO FSS satellite systems in the frequency bands 10.70-12.75 GHz and 14.00-14.50 GHz”, June 2017
- [4] ECC Decision (13)01 – “The use, free circulation, and exemption from individual licensing of Earth stations on mobile platforms (ESOMPs) in the frequency bands available for use by uncoordinated FSS Earth stations within the ranges 17.3-20.2 GHz and 27.5-30.0 GHz”, March 2013
- [5] ECC Decision (15)04 – “The harmonised use, free circulation and exemption from individual licensing of Land and Maritime Earth Stations On Mobile Platforms (ESOMPs) operating with NGSO FSS satellite systems in the frequency ranges 17.3-20.2 GHz, 27.5-29.1 GHz and 29.5-30.0 GHz”, July 2015
- [6] Directive 2002/20/EC of the European Parliament and of the Council of 7 March 2002 on the authorisation of electronic communications networks and services (Authorisation Directive)
- [7] Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC
- [8] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity
- [9] ERC Recommendation 01-07 – “Harmonised regime for exemption from individual licensing for the use of radio spectrum”, revised June 2004
- [10] ITU Radio Regulations, edition of 2016
- [11] ERC Recommendation 13-03 – “The use of the band 14.0 - 14.5 GHz for Very Small Aperture Terminals (VSAT) and Satellite News Gathering (SNG)”, December 1996
- [12] ECC Decision (03)04 – “Exemption from Individual Licensing of Very Small Aperture Terminals (VSAT) operating in the frequency bands 14.25 - 14.50 GHz Earth-to-space and 10.70-11.70 GHz space-to-Earth”, October 2003
- [13] ECC Decision (12)01 – “Exemption from individual licensing and free circulation and use of terrestrial and satellite mobile terminals”, amended November 2016
- [14] ETSI EN 303 980 V1.1.1 Satellite Earth Stations and Systems (SES); Harmonised Standard for fixed and in-motion Earth Stations communicating with non-geostationary satellite systems (NEST) in the 11 GHz to 14 GHz frequency bands covering essential requirements of article 3.2 of Directive 2014/53/EU
- [15] ECC Report 272 – “Earth Stations operating in the frequency bands 4-8 GHz, 12-18 GHz and 18-40 GHz in the vicinity of aircraft”, January 2018
- [16] ERC Decision (00)08 – “The use of the band 10.7 - 12.5 GHz by the fixed service and Earth stations of the broadcasting-satellite and fixed-satellite Service (space-to-Earth)”, October 2000
- [17] ERC Report 25 - “The European table of frequency allocations and applications in the frequency range 8.3 kHz to 3000 GHz”, updated October 2017
- [18] ECC Decision (06)02 – “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”, March 2006
- [19] ECC Decision (06)03 – “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”, March 2006
- [20] Recommendation ITU-R RA.769-2 - Protection criteria used for radio astronomical measurements