



ECC Decision (19)04

The harmonised use of spectrum, free circulation and use of earth stations on-board aircraft operating with GSO FSS networks and NGSO FSS systems in the frequency bands 12.75-13.25 GHz (Earth-to-space) and 10.7-12.75 GHz (space-to-Earth)

approved 6 March 2020

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EXPLANATORY MEMORANDUM

1 INTRODUCTION

Services provided by earth stations on-board aircraft operating to GSO satellite networks continue to grow with the increasing demand for Internet based applications for the airline industry and their passengers. NGSO satellite systems also plan to address this market. The use of the band 12.75-13.25 GHz, allocated to the fixed-satellite service (FSS), for the implementation of earth stations on-board aircraft allows satellites to provide additional capacity to meet the growing needs in this sector. The use of the band 12.75-13.25 GHz (Earth-to-space) by geostationary-satellite systems in the fixed-satellite service shall be in accordance with the provisions of Appendix 30B of the ITU Radio Regulations [1].

The purpose of this ECC Decision is to designate the frequency band 12.75-13.25 GHz for the use by earth stations on-board aircraft operating to GSO FSS networks and NGSO FSS systems, and to facilitate their free circulation and use¹, when such earth stations are licensed by the administration of the country where the aircraft is registered.

This ECC Decision provides a regulatory framework for authorising earth stations on-board aircraft on the condition that their deployment shall not cause harmful or unacceptable interference to authorised services. The authorised services within the CEPT, as identified in the European Common Allocation Table, are limited to the fixed service (FS) in the band 12.75-13.25 GHz, and GSO FSS networks operating with assignments in the band 12.75-13.25 GHz obtained under the Appendix 30B of the ITU Radio Regulations. Designating the band 12.75-13.25 GHz for the use by earth stations on-board aircraft, while maintaining compatibility with other services, allows for additional use of the spectrum. The space-to-Earth links of the GSO FSS networks and NGSO FSS systems operate in the 10.7-12.75 GHz band.

2 BACKGROUND

The CEPT recognises the importance of harmonised measures for the designation of frequency bands, authorisation of terminals and their free circulation and use (when such terminals have the capability for roaming), for services deployed or to be deployed on a pan-European basis. The CEPT also recognises the need to ensure the protection of other services deployed within the frequency bands of interest by adopting measures for interference avoidance or mitigation of interference. Such measures applying to the use of the 12.75-13.25 GHz band by earth stations on-board aircraft are discussed in this Decision in order to provide clarity and to assist with the implementation of such measures by the CEPT administrations.

Licensing

The licence for the use of all radio equipment installed on-board an aircraft, usually referred to as the aircraft station licence, is issued by the administration of the country where the aircraft is registered. The aircraft earth station located on board the aircraft should be listed in the licence. The Recommendation 7 of the ITU Radio Regulations [1] recommends that administrations should, as far as possible, endeavour to bring their national licence forms into line with the standard forms described in the Recommendation. Article 39 of the ITU Radio Regulations provides for the examination of such licences by inspectors of governments or appropriate administrations of countries visited by the aircraft carrying an aircraft earth station. However, some administrations may have regulatory frameworks that allow such earth stations to be exempted from requiring an individual licence. Administrations, in their consideration of licensing of earth stations on-board aircraft, may place additional conditions to be met by the operator.

The Radio Equipment Directive (RED), Directive 2014/53/EU [2], regulates the requirements that products, within its scope, must meet in order to be placed on the market and put into service (without prejudice to conditions attached to authorisations for the use of radio spectrum or other applicable EU legislation). The most common way for manufacturers to comply with these requirements is to apply the voluntary Harmonised Standards developed by ETSI. Manufacturer may apply other equivalent practices or specifications as provided in the RED to provide a presumption of conformity.

¹ "free circulation and use" means free circulation with permission to use the radio equipment.

Exemption from individual licensing

The ERC Recommendation 01-07 (revised in the year 2000) [3] recommended the harmonised criteria for exempting radio equipment from requiring an individual licence, recognising that administrations and especially users, retailers and manufacturers will benefit from a more deregulated system of licensing. The European Union also provides a legal framework for licensing. The Article 5 of the Authorisation Directive (Directive 2002/20/EC) [4] requires the use of spectrum to be facilitated under general authorisation, where, amongst other things, the risk of harmful interference to other radio services is negligible. Based on the above administrations may consider, when the efficient use of the frequency spectrum is not at risk and as long as harmful interference is unlikely, exempting the use of radio equipment located on-board the aircraft from individual licensing.

Free circulation and use

The Article 18 of the ITU Radio Regulations [1] requires any station established and operated in a country to be licensed by or on behalf of its government. It follows that when an aircraft overflies the airspace of another country the use of the aircraft earth station should be subject to appropriate authorisation by the administration of the country being overflown. The authorisation required when overflying another country could be dealt with under the free circulation and use provided for by the CEPT under spectrum management consideration. Examples of free circulation and use applied by the CEPT can be found in the ECC Decision (05)11 [6] and ECC Decision (13)01 [7].

Many CEPT administrations have already implemented free circulation and use for aircraft earth stations referenced in ECC Decision (05)11 and ECC Decision (13)01. Given that earth stations on-board aircraft provide valuable services, such as Internet based applications, for the airline industry and their passengers, seamless provision of such services across the airspace within Europe and elsewhere is of significant interest to operators, consumers, the aviation industry and satellite operators. Therefore, the agreements of all administrations for free circulation and use of earth stations on-board aircraft would be of paramount importance to all.

European allocations in the 12.75-13.25 GHz band

The European Frequency Table given in the ERC Report 25 [8] identifies European Common Allocations (ECA) for the band 12.75-13.25 GHz as fixed service and fixed-satellite service (Earth-to-space).

The band 12.75-13.25 GHz is extensively utilised for fixed links within Europe. ECC Report 173 (April 2018) [9] recorded that there are more than 70000 fixed links deployed within the CEPT.

The fixed-satellite service (Earth-to-space) identified in the ECA Table references the use of this band for assignments under the Appendix 30B of the ITU Radio Regulations [1]. Such FSS systems are implemented over Europe by several satellite operators.

Avoidance of interference to fixed links

The CEPT carried out a detailed technical study [10] to establish the conditions to be placed on the deployment of earth stations on-board aircraft in order to ensure the protection of the fixed links. The CEPT study concluded that the cumulative emissions resulting from earth stations on-board aircraft operating to both GSO and NGSO networks in the same frequency band would protect fixed links if the PFD mask on Earth resulting from each earth station on-board an aircraft is maintained within:

-123.5	$\text{dB(W/(m}^2 \cdot \text{MHz))}$	for		θ	\leq	5°
$-128.5 + \theta$	$\text{dB(W/(m}^2 \cdot \text{MHz))}$	for	5	$<$	θ	\leq 40°
- 88.5	$\text{dB(W/(m}^2 \cdot \text{MHz))}$	for	40	$<$	θ	\leq 90°

where θ is the angle of arrival above the horizontal plane at the fixed service station.

Recognising the results of the CEPT technical study, this ECC Decision provides a regulatory framework for the protection of the fixed service by placing an obligation on the operator to meet certain technical conditions listed in the Annexes 1 and 2 to this Decision. In addition, the operator is required to specify the technical details of the earth stations on-board aircraft in the declaration to be provided to the Office (see Annex 3 to this Decision).

Compatibility with the assignments of Appendix 30B

a) For GSO FSS networks:

All ITU Member States have been provided with equitable access to the geostationary-satellite orbit in frequency bands 4500-4800 MHz, 6725-7025 MHz, 10.70-10.95 GHz, 11.2-11.45 GHz and 12.75-13.25 GHz allocated to the fixed-satellite service. The Plan described in the Appendix 30B of the ITU Radio Regulations [1] provides "allotment" to each administration of 2 x 800 MHz bandwidth (up and down links) with a nominal orbital position to offer national coverage. The procedures for implementing GSO FSS networks in these bands with the conversion of national allotment into an assignment or by the introduction of an additional system or by modifying an existing assignment, are described in the Article 6 of the Appendix 30B. The assignments obtained in accordance with Appendix 30B, deployed with any FSS network (including those providing for earth stations on-board aircraft), shall be compatible with other allotments/assignments within the Plan and the List of the Appendix 30B.

The Appendix 30B places a requirement on the notifying administration to seek the agreement of any administration whose territory is, either partially or wholly included within the intended service area of the assignment.

The earth stations on-board aircraft, similar to any other earth station operating with Appendix 30B frequency assignments of a GSO FSS network, are to be operated within the authorised service area and with the characteristics notified for earth stations of the GSO FSS network (i.e. within the interference envelope established for earth stations of the GSO FSS network). Such operation therefore is unlikely to cause interference to other allotments/assignments of Appendix 30B. The authorised service area is the service area that includes only the territories of administrations who have given explicit agreement for the inclusion of their territory. The authorised service area shall exclude the territories of administrations who have not given their explicit agreement.

Article 9.1 of Appendix 30B of the Radio regulations states that "9.1 The Plan is limited to national systems providing a domestic service. Administrations may however, in accordance with the provisions of Article 6, convert their allotments or propose additional systems to provide national or multinational services."

This ECC Decision makes use of this possibility to provide multinational services.

b) NGSO FSS systems

In the case of earth stations on-board aircraft operating to NGSO satellite systems, No 5.441 of the ITU Radio Regulations [1] requires such systems to operate without causing unacceptable interference to GSO FSS networks or not to claim protection from GSO FSS networks. The protection of GSO FSS networks from unacceptable interference caused by FSS NGSO systems is ensured via the applicable provisions of the ITU Radio Regulations, in particular Article 22.5D and Resolution 85.

Stabilised earth station antennas deployed with earth stations on-board aircraft operating to both GSO networks and NGSO systems allow the earth station antenna to maintain a high degree of pointing accuracy even when the aircraft is moving rapidly or when the aircraft is subject to operational manoeuvres. The "closed-loop tracking" deployed with such satellite systems, uses the received signal strength to improve the pointing accuracy to a higher degree. In addition, the satellite system, to which the earth stations on-board aircraft belongs, has an inherent capability to keep the earth station in transmission disabled state unless an appropriate control signal is received from its satellite. These capabilities combined will ensure that earth stations on-board aircraft will not cause interference to other assignments of Appendix 30B. The ECC Decision (13)01 [7] and the ECC Decision (15)04 [11], which provided the regulatory framework for the operation of aircraft based earth station in-motion (ESIM) in the Ka-band, recognised the same capabilities of aircraft based ESIM when maintaining compatibility with other FSS networks.

Limitations on earth stations on-board aircraft in the vicinity of another aircraft

The ECC Report 272 [12] provides information on, amongst other things, the protection of aircrafts in flight from the emissions of earth stations on-board aircraft. The Report states that when two aircrafts are separated by the minimum distance of 500 ft (152.4 m) the required aircraft immunity level of the victim aircraft in the 12-18 GHz band can be met if the e.i.r.p. of the earth station is less than 74.46 dBW. This Decision limits the maximum e.i.r.p. of an earth stations on-board aircraft to 50 dBW. Therefore, earth stations on-board aircraft operating in the 12.75-13.25 GHz band should not be subjected to any restrictions in relation to this condition discussed in the ECC Report 272 [12].

3 REQUIREMENT FOR AN ECC DECISION

Earth stations on-board aircraft operating to GSO FSS networks in the frequency bands 12.75-13.25 GHz (Earth-to-space) and 10.7-12.75 GHz (space-to-Earth) are to be deployed in Europe with operational GSO FSS networks. NGSO systems deploy the same frequency bands to provide services throughout the world. The services that could be provided by earth stations on-board aircraft, include Internet based applications for the airline industry and their passengers, and will be of significant benefit to all users, including operators, consumers, the aviation industry and satellite operators. An ECC Decision is required to ensure that the authorisation of earth stations on-board aircraft within the CEPT will be subject to harmonised conditions such as those stipulated in this ECC Decision.

ECC DECISION OF 6 MARCH 2020 ON THE HARMONISED USE OF SPECTRUM, FREE CIRCULATION AND USE OF EARTH STATIONS ON-BOARD AIRCRAFT OPERATING WITH GSO FSS NETWORKS AND NGSO FSS SYSTEMS IN THE FREQUENCY BANDS 12.75-13.25 GHZ (EARTH-TO-SPACE) AND 10.7-12.75 GHZ (SPACE-TO-EARTH)

“The European Conference of Postal and Telecommunications Administrations,

considering

- a) that within the CEPT administrations there is the recognition of the need for harmonisation of licensing regimes in order to facilitate the provision of Pan-European services;
- b) that, installation and use of earth stations on-board aircraft is subject to either individual licensing or exemption from requiring an individual licence depending on the prevailing licensing framework in the relevant national administration of the country where the aircraft is registered;
- c) that the use of the band 12.75-13.25 GHz (Earth-to-space) by earth stations on-board aircraft operating to GSO FSS networks and NGSO FSS systems will offer additional spectrum to enhance broadband communications for aircraft passengers within the CEPT;
- d) that in the ITU Radio Regulations [1], the band 12.75-13.25 GHz is allocated on a worldwide and primary basis to the fixed-satellite service (Earth-to-space), and CEPT administrations have national allotments and assignments in the Plan and the List made under the provisions of Appendix 30B of the ITU Radio Regulations;
- e) that in the ITU Radio Regulations [1], the band 12.75-13.25 GHz is allocated on a worldwide and primary basis to the fixed and mobile services;
- f) that the earth stations on-board aircraft operating to GSO FSS networks and NGSO FSS systems in the frequency bands 12.75-13.25 GHz shall provide required protection to the fixed links operating under the fixed service allocation mentioned in considering e);
- g) that earth stations on-board aircraft operating to GSO FSS networks and NGSO FSS systems in the frequency band 12.75-13.25 GHz shall be under the control of the satellite network or system;
- h) that the frequency band 10.7-12.5 GHz is used by fixed-satellite service stations (space-to-Earth) and fixed service stations on a shared basis;
- i) that in EU/EFTA countries the radio equipment that is under the scope of this Decision shall comply with the Radio Equipment Directive [2]. Conformity with the essential requirements of the RED may be demonstrated by compliance with the applicable harmonised European standard(s), cited in the Official Journal (OJ) of the European Union, or by using other conformity assessment procedures set out in the RED;
- j) that the applicable harmonised European standards are ETSI EN 302 186 for GSO FSS networks [13], and draft ETSI EN 303 984 for NGSO FSS systems [14] which is under development²;
- k) that some CEPT administrations may require that operators of GSO FSS networks and NGSO FSS systems to comply with specific regulatory conditions and/or obtain an individual authorisation for their network due to national regulatory requirements.

DECIDES

1. that the **purpose of this ECC Decision** is to:
 - a. harmonise the use and allow the free circulation and use of earth stations on-board aircraft operating to GSO FSS networks and NGSO FSS systems within the frequency bands 12.75-13.25 GHz (Earth-to-space) and 10.7-12.75 GHz (space-to-Earth);

² As of May 2021 ETSI EN 303 984 remains as a draft standard

- b. apply the technical conditions necessary to ensure harmful interference is not caused by earth stations on-board aircraft to the stations of the fixed service (FS) in the band 12.75-13.25 GHz, and to maintain compatibility with other GSO FSS networks operating under the Appendix 30B of the Radio Regulations [1];
2. that CEPT **administrations shall**:
 - a) designate the frequency bands 12.75-13.25 GHz (Earth-to-space) and 10.7-12.75 GHz (space-to-Earth) for the use of earth stations on-board aircraft operating to GSO FSS networks and NGSO FSS systems;
 - b) allow the free circulation and use of earth stations on-board aircraft that are licensed by the administration of the country where the aircraft is registered;
 - c) inform the Office of their requirements relating to considering k).
3. that all earth stations on-board aircraft operating to GSO FSS networks or NGSO FSS systems shall:
 - a) comply with the requirements in **Annex 1** to ensure the protection of the fixed service and compatibility with other GSO FSS networks operating under the Appendix 30B of the ITU Radio Regulations [1];
 - b) ensure harmful interference is not caused to the stations of the fixed service by complying with the requirements in **Annex 2**;
 - c) be listed in the aircraft station licence issued by the administration of the country where the aircraft is registered.
4. that **Annex 3** information shall be provided to the Office by the operator;
5. that this Decision **enters into force** on date: 06 March 2020;
6. that the preferred **date for implementation** of this Decision shall be date: 06 September 2020;
7. 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://docdb.cept.org/> for the up to date position on the implementation of this and other ECC Decisions.

ANNEX 1: TECHNICAL AND OPERATIONAL REQUIREMENTS FOR EARTH STATIONS ON-BOARD AIRCRAFT OPERATING WITH GSO FSS NETWORKS AND NGSO FSS SYSTEMS IN THE FREQUENCY BAND 12.75-13.25 GHZ

Earth stations on-board aircraft operating to GSO FSS networks and NGSO FSS systems in the frequency band 12.75-13.25 GHz shall comply with the following technical and operational requirements:

1. The earth stations on-board aircraft shall operate under the control of a Network Control Facility (NCF);
2. The maximum e.i.r.p. of the earth stations on-board aircraft is limited to 50 dBW;
3. The design, coordination and operation of the earth stations on-board aircraft shall take into account 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.
4. Earth stations on-board aircraft that use closed-loop tracking of the satellite signal shall employ an algorithm that is resistant to capturing and tracking signals from nearby satellite. The earth stations shall immediately cease transmissions when they detect that unintended satellite tracking has happened or is about to happen;
5. Earth stations on-board aircraft shall be self-monitoring and should a fault which could cause harmful interference to the fixed service and/or unacceptable interference to other GSO FSS networks and NGSO FSS systems be detected, the earth stations on-board aircraft must automatically cease its transmissions;
6. The earth stations on-board aircraft either conform to the ETSI EN 302 186 [13] for GSO FSS networks and draft ETSI EN 303 984 for NGSO FSS systems [14] or to other conformity assessment procedures set out in the Directive 2014/53/EU (RED) [2]

ANNEX 2: ADDITIONAL TECHNICAL AND OPERATIONAL REQUIREMENTS FOR EARTH STATIONS ON-BOARD AIRCRAFT OPERATING WITHIN THE FREQUENCY BAND 12.75-13.25 GHZ

The earth stations on-board aircraft shall meet the PFD values on Earth given below:

-123.5	dB(W/(m ² · MHz))	for	$\theta \leq 5^\circ$
-128.5 + θ	dB(W/(m ² · MHz))	for	$5 < \theta \leq 40^\circ$
- 88.5	dB(W/(m ² · MHz))	for	$40 < \theta \leq 90^\circ$

where θ is the angle of arrival above the horizontal plane at the fixed service station location.

ANNEX 3: PARAMETERS AND THE DECLARATION NEED TO BE SUBMITTED TO THE OFFICE BY THE OPERATORS OF EARTH STATIONS ON-BOARD AIRCRAFT

A3.1 THE NETWORK OPERATOR RESPONSIBLE FOR THE EARTH STATIONS ON-BOARD AIRCRAFT IS REQUIRED TO SUBMIT TO THE OFFICE THE FOLLOWING INFORMATION:

- Points of Contacts:
 - Network Operator's designated point of contact
 - Title of contact
 - Postal address
 - Telephone and fax numbers
 - email address
 - Network Control Facility (NCF) designated point of contact
 - Title of contact
 - Postal address
 - Telephone and fax numbers
 - email address
- Technical Specification(s) of earth stations on-board aircraft used in the network
 - Earth stations on-board aircraft Antenna
 - Antenna type
 - Antenna size
 - Transmit peak gain
 - Max e.i.r.p. per carrier
 - Transmit frequency bands
 - Min. operating elevation
 - Antenna pointing accuracy
 - Waveform characteristics
 - Number(s) of carriers per earth station on-board aircraft
 - Occupied bandwidth(s) per carrier (as defined in Harmonised Standard EN 302 186 or draft EN 303 984)
 - Carrier centre frequency(-ies)
 - Modulation
 - Multiple access scheme
 - Operating details of each satellite
 - ITU BR Filing Information
 - ITU BR filing name of the GSO satellite network or NGSO satellite system
 - ITU BR circular reference number and date of publication of the Special Section
 - Satellite operator(s) (commercial) name
 - GSO longitude (East or West from Greenwich) for GSO networks
 - Satellite service area (text description and/or a figure of the area)
 - Forward Channel details (Satellite to earth stations on-board aircraft)
 - Transponder(s) downlink centre frequency
 - Transponder(s) downlink bandwidth
 - Return Channel details (earth stations on-board aircraft to satellite)
 - Transponder(s) uplink centre frequency
 - Transponder(s) uplink bandwidth
- Other details

In addition, operators of earth stations on-board aircraft need to notify the Office of the name of the airlines which will be using their network system. Alternatively, operators could provide to the Office a link to their webpage containing this information.

A3.2 DECLARATION TO BE SUBMITTED BY THE OPERATOR

Any GSO or NGSO FSS operator intending to deploy earth stations on-board aircraft within the framework of this ECC Decision is required to submit to the Office (<https://www.cept.org/eco>) a declaration given in Table 1. Any future changes to the information sought by the declaration should also be brought to the attention of the Office as soon as possible.

Table 1: Declaration to be provided to the Office

Information required	Information
Operator's name	
Operator's Contact information	
Commercial name of the satellite network(s)	
Network Control Facility contact details (address, telephone number, email)	
Confirmation that earth stations on-board aircraft operating in the frequency band 12.75-13.25 GHz (Earth-to-space) shall comply with the technical and operational requirements in Annexes 1 and 2	
State the type (manufacturer, model number etc.) of earth station(s) installed on the aircraft.	

ANNEX 4: LIST OF REFERENCES

This annex contains the list of relevant reference documents.

- [1] ITU Radio Regulations, Edition of 2016
- [2] 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
- [3] ERC Recommendation 01-07: "ERC Recommendation of 1997 on harmonised regime for exemption from individual licensing for the use of radio spectrum", June 2004
- [4] 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)
- [5] Convention on International Civil Aviation, signed at Chicago on 7 December 1944
- [6] ECC Decision (05)11: "The free circulation and use of Aircraft Earth Stations (AES) in the frequency bands 14-14.5 GHz (Earth-to-space), 10.7-11.7GHz (space-to-Earth) and 12.5-12.75 GHz (space-to-Earth)", March 2019
- [7] 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", October 2018
- [8] ERC Report 25: "The European table of frequency allocations and applications in the frequency range 8.3 kHz to 3000 GHz", March 2019
- [9] ECC Report 173: "Fixed Service in Europe Current use and future trends post 2016", April 2018
- [10] Document: FM(18)055: "LS from WGSE on GSO and NGSO FSS ESIM in 13 GHz"
- [11] 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", March 2019
- [12] 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
- [13] ETSI EN 302 186: "Satellite Earth Stations and Systems (SES); Harmonised Standard for satellite mobile Aircraft Earth Stations (AESs) operating in the 11/12/14 GHz frequency bands covering the essential requirements of article 3.2 of the Directive 2014/53/EU"
- [14] Draft ETSI EN 303 984: "Satellite Earth Stations and Systems (SES); Harmonised Standard for aircraft earth stations communicating with non-geostationary satellite systems in the 11 GHz / 13GHz frequency bands covering essential requirements of article 3.2 of Directive 2014/53/EU"