

FM44#65 meeting

Web meeting, 10-12 May 2021

Date issued: 30 April 2021

Source: CRAF

Subject: RAS protection in ECC/DEC(17)04

Group membership required to read? (Y/N)

N

Summary:

The two ECC decisions currently in force for the NGSO LEO constellations operating in Ku-band are:

- ECC/DEC(17)04 (The harmonised use and exemption from individual licensing of fixed earth stations operating with NGSO FSS satellite systems in the frequency bands 10.7-12.75 GHz and 14.0-14.5 - GHz)
- ECC/DEC(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)

CRAF notes that while ECC/DEC(18)05 considers RAS protection in accordance with ECC Report 271, its counterpart for fixed earth stations ECC/DEC(17)04 does not include any similar consideration nor reference to ECC report 271. While ECC/DEC(18)05 and ECC/DEC(17)04 address different terminal usage, both uses were considered in the sharing and compatibility studies under ECC report 271

Proposal:

Revise the ECC/DEC(17)04 to include RAS protection incorporated by referencing to the ECC report 271, corresponding to the case with ECC/DEC(18)05. Proposed additions are inserted in Yellow in the attached ECC Decision.

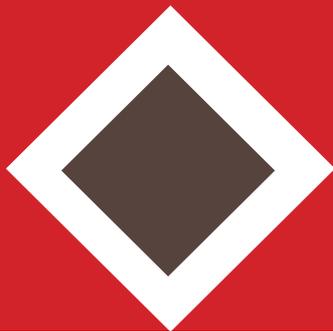
Background:

ECC Report 271 contains compatibility and sharing studies between the operations of non-Geostationary Satellite Orbit (NGSO) Fixed Satellite Service (FSS) systems in both space-to-Earth and Earth-to-space directions and the incumbent services.

The Report presents the studies of two NGSO FSS systems: OneWeb and SpaceX. The studies cover the compatibility of the operations in the FSS downlink allocation in the band 10.7-12.75 GHz with the radio astronomy service (RAS) and the EESS (earth exploration-satellite service) (passive), and the compatibility of the earth stations using the FSS uplink allocation in the band 14-14.5 GHz with the fixed service (FS) and the RAS.

In the study of the OneWeb system, two kinds of earth station were considered, namely the fixed stations, and Earth Stations In-Motion (ESIM). The ESIM include mobile stations on land, ships and aircraft. The study

of the SpaceX system specifically focused on the compatibility of SpaceX's NGSO operations in the FSS downlink allocation in the 10.7-12.75 GHz band with the passive RAS and EES services as well as the compatibility of fixed Earth Stations using the FSS uplink allocation in the 14-14.5 GHz band with the Fixed Service (FS) and the RAS.



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 10.7-12.75 GHz and 14.0-14.5 GHz

Approved 30 June 2017

Amended: 8 March 2019

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) for fixed earth stations operating with NGSO satellite systems within the fixed-satellite service (FSS) allocation, and exemption from individual licensing of such earth stations. These NGSO systems provide a range of communications services with the main provision being broadband communication services. These earth stations are fixed at a given location with antennas that track continuously the satellites in non-geostationary orbits.

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 the installation and use of equipment need to be proportionate. Administrations and especially users, retailers and manufacturers will benefit from a more deregulated system of authorising the use of radio equipment such as licence exemption.

2 BACKGROUND

Article 5 of the Authorisation Directive (Directive 2002/20/EC) [1] 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. With the implementation of the Authorisation Directive and also with the essential requirements of Radio Equipment Directive, administrations have exempted many radio equipment from individual licensing, including satellite terminals. The provision of Pan European services will be greatly assisted when all CEPT administrations exempt the same categories of radio equipment from individual licensing based on given conditions. Such conditions should only relate to harmful interference and the measures that could be adopted to mitigate the possibility of harmful interference. Consequently, the installation and use of satellite terminals that are specifically identified as operating with power levels and operational conditions that are unlikely to cause harmful interference to other authorised services might be exempted from individual licensing.

Furthermore, the Radio Equipment Directive 2014/53/EU [2] places an emphasis on efficient and effective use of the spectrum. This is achieved by requiring the performance of the transmitter, as well as its receiver, meeting certain performance specifications. The relevant ETSI harmonised standards carry such specifications on both receiver and transmitter parameters which ensure that equipment does not cause harmful interference to other systems and services as well as equipment is built to use spectrum efficiently.

The band 14-14.5 GHz band is allocated on a worldwide and primary basis to the FSS (Earth-to-space) in the ITU RR [3], and it is generally available for satellite services within the CEPT and elsewhere. The band 14.25-14.5 GHz band is used by a small number of point-to-point microwave links of the fixed service in a limited number of CEPT countries.

CEPT/ERC Recommendation 13-03 (The Hague 1996) [4] 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 [5] was adopted and it provides for licence exemption of VSAT operating in the 14.25-14.5 GHz with e.i.r.p. of no more than 50 dBW subject to the conditions stipulated in the said ECC Decision.

Given the comparable operational characteristics of both VSATs and fixed earth stations operating with NGSO FSS satellite systems in the frequency bands 14.0-14.5 GHz (Earth-to-space), and noting that earth stations operating to polar orbiting satellite will have high angles of elevation, the technical and regulatory conditions that apply to VSAT as described in ECC Decision (03)04 could also be applied to NGSO fixed earth stations mentioned in this ECC Decision.

The electromagnetic compatibility between satellite terminals and aircraft avionics has been examined in ECC Report 272 on the “Earth Stations operating in the frequency bands 4-8 GHz, 12-18 GHz and 18-40 GHz in the vicinity of aircraft” [6]. This Report provides the maximum earth station e.i.r.p. levels to ensure compliance with aircraft High Intensity Radiated Field (HIRF) protection criteria.

Maximum e.i.r.p. levels for earth stations retained in this ECC Decision are equal to or lower than maximum e.i.r.p. based on ECC Report 272 that ensures compliance with aircraft HIRF protection criteria. Therefore, the maximum e.i.r.p. levels indicated in this Decision implicitly provides the necessary protection for aircraft HIRF.

It is recognised that protection from unacceptable interference to geostationary satellites networks operating in the bands considered in this Decision is ensured via the applicable sections of the ITU Radio Regulations, in particular Article 22.2, 22.5C to 22.5I and Resolution 85 [3].

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 [12]).

The protection of RAS stations performing observations in the secondary RAS allocation in the frequency band 14.47-14.5 GHz can be achieved through areas around such stations where any NGSO FSS earth station will have to cease transmissions on channels overlapping with the band 14.47-14.5 GHz. The size of the areas has to be determined on a case-by-case basis taking into account the FSS and terrain characteristics. For FSS terminals with an e.i.r.p. towards the horizon of -20 dBW/(40 kHz) the size of the area can be up to 340 km (single entry analysis), thus not limiting it to a national issue for some of these RAS stations. (see ECC Report 271 [12]).

3 REQUIREMENT FOR AN ECC DECISION

Fixed earth stations 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 specially 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 stipulated in such an ECC Decision.

ERC Recommendation 01-07 [7], 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 fixed earth stations 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 30 JUNE 2017 ON THE HARMONISED USE AND EXEMPTION FROM INDIVIDUAL LICENSING OF FIXED EARTH STATIONS OPERATING WITH NGSO FSS SATELLITE SYSTEMS IN THE FREQUENCY BANDS 10.7-12.75 GHz AND 14.0-14.5 GHz (ECC/DEC/(17)04), AMENDED ON 8 MARCH 2019

“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 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 FSS (Earth-to-space) in the ITU Radio Regulations [3];
- d) that the band 14.25-14.5 GHz is allocated on a worldwide and primary basis to the FSS (Earth-to-space) amongst other services in the ITU Radio Regulations;
- 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;
- f) that the band 14.3-14.4 GHz in Region 1 and 14.4-14.5 GHz on a worldwide basis and 14.25-14.3 GHz in some countries (through RR footnote 5.508 [3]) 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 [3]);
- 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 Decision ERC Decision (00)08 [8] 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;
- k) that Radio Regulations No. 5.492 [3] 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 [3] urges administrations in making assignments to stations of other services in the band 14.47-14.5 GHz, which is also allocated to 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 fixed earth stations operating with NGSO FSS satellite systems in the frequency bands 10.7-12.75 GHz and 14.0-14.5 GHz need to maintain compatibility with other services mentioned in considerings e), f), g), h), i), k) and l) above;
- n) that Radio Regulations No. 22.2 addresses the protection of geostationary satellite networks in the fixed-satellite service and the broadcasting-satellite service;

- o) that ECC Decision (06)02 [9] and ECC Decision (06)03 [10] 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 [5] 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 deployment of fixed earth stations 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;
- r) that fixed earth stations operate within NGSO FSS satellites systems in the frequency bands 10.7-12.75 GHz (space-to-Earth) and 14.0-14.50 GHz (Earth-to-space) under the control of the satellite system;
- s) that in EU/EFTA countries the use of such equipment shall comply with the Radio Equipment Directive [2], which provides for the presumption of conformity with the essential requirements set out in its Article 3(2) by demonstrating compliance with Harmonised European Standard EN 303 980 [11] or equivalent technical specifications;
- t) that some CEPT administrations may require that operators of NGSO FSS satellite systems to obtain an individual authorisation for their network due to national regulatory requirements;
- u) that those 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 fixed earth stations from individual licensing based on harmonised criteria detailed in ERC Recommendation 01-07 [7];
- v) that ECC Report 272 [6] provides the requirements established to ensure compliance with aircraft HIRF protection criteria.
- w) that ECC Report 271 [1] provides methods for the management of the compatibility between these earth stations in FSS and Fixed Service, EESS and RAS;

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 fixed earth stations operating with NGSO FSS satellite systems;
 - b) allow exemption from individual licensing of fixed earth stations 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);
2. **establish the technical conditions necessary to ensure harmful interference is not caused by fixed earth stations operating with NGSO FSS satellite systems to stations of the radio astronomy service**
3. that CEPT **administrations shall** designate the frequency bands 10.7-12.75 GHz (space-to-Earth) and 14.0 - 14.5 GHz (Earth-to-space) for the use of fixed earth stations operating with NGSO FSS satellite systems;
4. that **CEPT administrations shall** allow exemption from individual licensing of fixed earth stations that:
 - a) comply with the requirements in Annex 1;
 - b) operate on a non-protected basis with regards to the fixed service stations of the frequency band 10.7-11.7 GHz;

- c) operate with NGSO FSS satellite systems while maintaining compatibility with other services as mentioned in considerings e), f), g), h), i), k) and l) above;
 - d) fulfil considering s), without prejudice to considering t);
5. that this Decision **enters into force** on date 30 June 2017;
 6. that the preferred **date for implementation** of this Decision shall be 30 December 2017;
 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://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 FIXED EARTH STATIONS OPERATING WITH NGSO FSS SATELLITE SYSTEMS IN THE FREQUENCY BANDS 10.7-12.75 GHz AND 14.0-14.5 GHz

Fixed earth stations 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 fixed earth stations shall operate under the control of a Network Control Facility (NCF);
2. The design, coordination and operation of the fixed earth stations 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. That use closed-loop tracking of the satellite signal shall employ an algorithm that is resistant to capturing and tracking signals from nearby satellite. Fixed earth stations shall immediately inhibit transmissions when they detect that unintended satellite tracking has happened or is about to happen;
4. Fixed earth stations shall be in conformance with the Harmonised European Standard EN 303 980;
5. The fixed earth stations comply with the following requirements that ensure compliance with aircraft HIRF protection criteria based on ECC Report 272, using maximum HIRF field strengths of 190 V/m in 14.00-14.5 GHz:
 - a) The maximum e.i.r.p. of earth stations shall be limited to 60 dBW ;
 - b) The maximum e.i.r.p. of earth stations operating within TDMA networks shall be respected after taking into consideration the duty cycle (see section 3.3 and 3.4 of ECC Report 272 [6]);
 - c) 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.

ANNEX 2: LIST OF REFERENCES

This annex contains the list of relevant reference documents.

- [1] 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)
- [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] ITU Radio Regulations, Edition of 2016
- [4] 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
- [5] ECC Decision (03)04: "The 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"
- [6] 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
- [7] ERC Recommendation 01-07: "Harmonised regime for exemption from individual licensing for the use of radio spectrum", amended June 2004
- [8] 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
- [9] 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
- [10] 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"
- [11] ETSI Harmonised European Standard 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"
- [12] 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)