



Extension of satellite earth station licensing to permit operation with non-geostationary satellites

Publication date:

24 March 2016

About this document

Due to growing interest in the use of non-geostationary orbit (NGSO) satellite networks we will be extending a number of existing satellite earth station licence products to permit operation with NGSO satellites.

This document sets out the changes Ofcom will make to the following satellite earth station licence products:

- Satellite (Earth Station Network);
- Satellite (Non-Geostationary Earth Station);
- Notice of Variation (NoV) of the Ship Radio licence for Earth Stations on Vessels (ESVs); and
- NoVs to the Ship and Aircraft Radio licences for Earth Stations On Moving Platforms (ESOMPs).

The changes will enable consumers and citizens in the UK, and on UK registered ships and aircraft, to benefit from broadband services provided by NGSO satellite networks. These networks are able to offer lower latency services than GSO satellite networks due to their lower orbit.

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Section 1

Overview

Introduction

- 1.1 In the UK the use of all wireless telegraphy equipment needs to be either licensed or exempt from licensing under the Wireless Telegraphy Act 2006. Anyone who wishes to operate a satellite earth station in the UK (or on a UK registered ship or aircraft), therefore needs to have a relevant licence. At present, many of the licence products for satellite earth stations available from Ofcom only allow operation with geostationary orbit (GSO) satellites.
- 1.2 The use of GSO satellites has in the past been the primary means of providing commercial satellite services such as internet connectivity. However, in recent years there has been a growing interest in the use of non-geostationary orbit (NGSO) satellite networks to deliver these types of services. Given this growth, we will extend the terms of a number of existing satellite earth station licence products that are available from Ofcom to permit operation of earth stations with NGSO satellites.
- 1.3 In enabling the licensing of earth stations operating with NGSO satellites we need to consider the impact of doing so on other users of spectrum. In relation to the impact on other GSO satellite users we believe the requirements of Article 22 of the ITU Radio Regulations will ensure appropriate protection from interference. In addition NGSO systems have to co-ordinate with other NGSO systems under the ITU coordination and notification procedures in order to avoid interference to each other. No other (non-satellite) spectrum users are affected by the changes we are making.
- 1.4 These changes are consistent with the proposal in our Space Spectrum Strategy¹ to prioritise enabling growth in satellite broadband. One means of enabling this growth is to liberalise spectrum use to support new ways of using existing satellite spectrum allocations, including enabling the use of NGSO satellite networks.
- 1.5 In particular, the changes we make will enable consumers and citizens in the UK (especially in locations that are hard to serve by terrestrial networks), and on UK registered ships and aircraft, to benefit from broadband services provided by NGSO satellite networks. These networks are able to offer lower latency services than GSO satellite networks due to their lower orbit. The changes will also enable satellite operators to deploy gateway earth stations in the UK to provide connectivity between NGSO satellites and terrestrial networks, such as the Internet.
- 1.6 Prospective licensees will be able to apply for the new earth station licence products and existing licensees can continue to operate under their existing licence. Should an existing licensee want to operate under the revised terms and conditions they may request a variation to their existing licence.

¹ http://stakeholders.ofcom.org.uk/consultations/space-spectrum-strategy/?utm_source=updates&utm_medium=email&utm_campaign=space-spectrum-strategy

Summary of changes

- 1.7 The specific changes we are making to the satellite earth station licence products are to:
- extend the Satellite (Earth Station Network) licence product to permit operation with a NGSO satellite network;
 - modify the existing Satellite (Non-Geostationary Earth Station) licence product to ensure its terms are consistent with those in the extended Satellite (Earth Station Network) licence;
 - amend the Ship Radio Licence via a Notice of Variation (NoV) for Earth Stations on Vessels (ESVs) to permit operation with a NGSO satellite network; and
 - amend the Ship Radio Licence via a NoV for Earth Stations On Moving Platforms (ESOMPs) to permit operation with a NGSO satellite network.
- 1.8 One of the key additional requirements included in the licence products referenced above is compliance with the relevant equivalent power flux density (epfd) limits specified in Article 22 of the ITU Radio Regulations.
- 1.9 The updated satellite earth station licence products will give licensees the flexibility to operate with either a GSO or NGSO satellite network. Should a licensee want to operate with both a GSO and NGSO network they will require a separate licence product for each network. The changes we will make will only allow for operation with one network (GSO or NGSO) per individual licence.
- 1.10 The changes we will make to extend the satellite earth station licence products are detailed in Annex 1 with copies of the amended licence products in Annexes 2 – 5.

Fees

- 1.11 The existing fee structure that currently applies to the relevant licence products will apply when we implement the changes summarised above. Details of the existing fees structure can be found in The Wireless Telegraphy (Licence Charges) Regulations 2005² (and relevant amendments) and on the Ofcom website³.
- 1.12 We are currently undertaking a separate review of spectrum fees for fixed links and satellite services⁴ and plan to publish a separate consultation document on specific fee proposals later in the year.

² <http://www.legislation.gov.uk/ukxi/2005/1378/contents/made>

³ <http://licensing.ofcom.org.uk/binaries/spectrum/satellite-earth-stations/fees.pdf>

⁴ http://stakeholders.ofcom.org.uk/consultations/review-spectrum-fees-fixed-links-satellite/?utm_source=updates&utm_medium=email&utm_campaign=review-spectrum-fees-fixed-links-satellite

Interface Requirements

- 1.13 In addition to extending the satellite earth station licence products the relevant Interface Requirements (IRs): IR2077⁵ (Satellite Earth Station Networks); and IR2093⁶ (Earth stations On Mobile Platforms) will also be updated for NGSO operation as required under the Radio and Telecommunications Terminal Equipment Directive (R&TTED) 1999/5/EC and Directive 98/34/EC⁷.
- 1.14 Whilst Ofcom will be able to grant licences to authorise the use of NGSO networks, they do not substitute any other relevant regulatory requirements the applicant must meet. These include, but are not limited to, the relevant ITU coordination and notification procedures.

Aeronautical satellite (earth station networks) use

- 1.15 The changes we will make to the Satellite (Earth Station Network) licence product will have the effect of permitting the use of NGSO satellite apparatus on board aircraft. However the use of this product to authorise satellite apparatus on aircraft is currently different to the process for authorising the use of all other types of radio equipment on aircraft. The use of other radio equipment is authorised through the issuing of a Notice of Variation to the Aircraft Radio Licence (as demonstrated with the Notice of Variation to the Aircraft Radio Licence for ESOMPs). The latter approach is consistent with international obligations under the Convention on International Civil Aviation and the ITU Radio Regulations.
- 1.16 Therefore, we believe it is desirable to bring the authorisation of satellite apparatus on board aircraft in line with our approach to other products, consistent with international obligations. Consequently stakeholders should be aware that we will be consulting on further changes to the Satellite (Earth Station Network) licence, likely to be in the next 12 - 18 months. The consultation will seek to address the most suitable means of authorising satellite terminals on aircraft, while complying with our obligations to the international community⁸.

Maritime licensing – Earth Stations on Vessels (ESVs) and Earth Stations On Moving Platforms (ESOMPs)

- 1.17 To enable the use of NGSO earth stations on board vessels we will amend the existing Notices of Variation to the Ship Radio Licence for the use of ESVs and ESOMPs.

⁵ <http://stakeholders.ofcom.org.uk/binaries/spectrum/spectrum-policy-area/spectrum-management/research-guidelines-tech-info/interface-requirements/ir2077.pdf>

⁶ http://stakeholders.ofcom.org.uk/binaries/spectrum/spectrum-policy-area/spectrum-management/research-guidelines-tech-info/interface-requirements/IR_2093.pdf

⁷ Please note that this is in the process of being superseded by the Radio Equipment Directive (RED) 2014/53/EU to be implemented by 13 June 2016.

⁸ Article 30 of the Convention on International Civil Aviation and Article 18 of the ITU Radio Regulations each requires all radio apparatus carried or installed in an aircraft to be covered by a licence issued by the flag state of the aircraft.

- 1.18 ESOMPs and ESVs are terminals with directional antennas that track the satellites in GSO or NGSO for the provision of broadband communication services.
- 1.19 We currently authorise ESOMPs and ESVs by varying the Ship Radio Licence (“SRL”) with the appropriate Notice of Variation (“NoV”) for each type of earth station. This is because these terminals are installed as part of the ship station and, as such, must be included in the radio licence that authorises that station. This is provided for in Article 18 and Appendix 16 of the ITU Radio Regulations. In practical terms, if a ship were inspected overseas by a marine surveyor and radio apparatus were found that did not appear on the ship’s radio licence, the ship’s master might be penalised. The converse applies to foreign ships visiting the UK.
- 1.20 The changes we are making in relation to the ESOMPs NoV are based on the framework described in ECC Decision 15(04) (ECC/Dec/(15)04⁹) (for vessels and other transportable platforms, excluding aeronautical use).
- 1.21 ECC/Dec/(15)04 addresses the use of Land and Maritime Earth Stations On Mobile Platforms (ESOMPs)¹⁰ which operate with Fixed-Satellite Service (FSS) NGSO satellite systems in the frequency bands 17.3-20.2 GHz (space-to-Earth), 27.5-29.1 GHz and 29.5-30.0 GHz (Earth-to-space). This ECC Decision does not apply to aeronautical deployed ESOMPs.
- 1.22 The changes we are making to the ESV NoV are to standardise the conditions across the various earth station products detailed in this document. These changes are primarily to ensure that earth stations on UK registered vessels operating with NGSO satellites comply with Article 22 of the ITU Radio Regulations in relation to the control of interference to GSO satellite systems.
- 1.23 The changes to the Notices of Variation for ESVs and ESOMPs to the Ship Radio Licence are addressed further in Annex 1. Annexes 4 and 5 contain a copy of the NoV terms and conditions incorporating the proposed changes for ESVs and ESOMPs respectively.

Aircraft licensing – Earth Stations On Moving Platforms (ESOMPs)

- 1.24 ECC/Dec/(15)04 does not address aircraft mounted ESOMPs operating in the 27.5-29.1 GHz and 29.5-30.0 GHz bands.
- 1.25 As a result, we are not, at this stage, updating the existing earth station licence product for the provision of ESOMPs on aircraft (e.g. the Notice of Variation for ESOMPs to the

⁹ECC Decision (15)04 <http://www.ero-docdb.dk/Docs/doc98/official/pdf/ECCDEC1504.PDF> -

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

¹⁰ It should be noted that ESOMPs mentioned in this Decision without a qualification refer to Land and Maritime ESOMPs operating to NGSO satellite systems. When reference is made to ESOMPs operating to GSO networks, they are referred to as “GSO ESOMPs”

Aircraft Radio licence) to include NGSO use. This decision will be reviewed pending the completion of any technical compatibility studies.

Next steps

- 1.26 We will soon notify the relevant IRs to the European Commission. Subject to any comments from the European Commission or other Member States we expect the IRs to be approved by Q3 2016.
- 1.27 We will also make the necessary changes to our ICT spectrum management systems to facilitate licensing of NGSO earth stations. We aim to implement these changes and be in a position to start licensing under the new terms and conditions by Q3 2016.

Annex 1

Extensions and modifications to Satellite Earth Station licence products

Extension to the Satellite (Earth Station Network) licence

A1.1 To extend the flexibility of the Satellite (Earth Station Network) licence to permit operation with NGSO satellite networks the following changes will be made to the Satellite (Earth Station Network) licence schedules.

A1.2 In Schedule 1(1) the reference to Non-Geostationary satellites will be included to clarify the applicable licence product types:

“1. The Licensee may establish and use:

Permanent, transportable or mobile sending and receiving Network Earth Station(s) ("the Station(s)") for the purpose of providing Wireless Telegraphy links between the Station(s) and Geostationary **or Non-Geostationary** Satellite(s).”

A1.3 In Schedule 1(2) new conditions will be added that relate to the Non-Geostationary satellites and distinction made between which conditions and frequency bands apply to each type of use:

“2. Limitations on use

The Stations(s) **operating with Geostationary Satellites** shall:

- a) transmit within one or more of the following frequency ranges: 14.0-14.25 GHz, 27.5 - 27.8185 GHz, 28.4545 - 28.8265 GHz, 29.4625 - 30 GHz;
- b) transmit only to the satellite and its associated orbital longitude specified in Schedule 2;

Land Station(s) operating with Non-Geostationary Satellites shall:

- c) **transmit within one or more of the following frequency ranges: 14.0-14.25 GHz, 27.5 - 27.8185 GHz, 28.4545 - 28.8265 GHz, 29.5 - 30 GHz;**
- d) **transmit only to the satellite network specified in Schedule 2;**

Aeronautical Station(s) operating with Non-Geostationary Satellites shall:

- e) **transmit within the frequency range 14.0-14.25 GHz;**
- f) **transmit only to the satellite network specified in Schedule 2.”**

- A1.4 In addition the e.i.r.p referenced in Schedule 1(2) will be increased from 50 dBW to 55 dBW. This is an editorial update to reflect the changes made to IR 2077 in 2010:

“Additionally:

- g) stations(s) that transmit with e.i.r.p. greater than **55 dBW** shall operate only with prior consent from Ofcom and registration of the station(s) against the licence”

- A1.5 In Schedule 1(3) the reference to Non-Geostationary satellites will be included in 3(b) and a new condition inserted (3(c)) to identify that NGSO use needs to comply with Article 22¹¹ of the ITU Radio Regulations in relation to the control of interference to geostationary-satellite systems:

“3.Apparatus

The Licensee shall ensure that:

- a) The apparatus comprised in the Station(s) ("the Apparatus") is so designed, constructed, maintained and operated, that its use does not cause any undue interference to other users of the spectrum.
- b) The apparatus complies with (and is maintained in accordance with) the relevant performance specification(s) published by the operator(s) of the Geostationary **or Non-Geostationary** Satellite(s)
- c) **The earth stations operating with Non-Geostationary Satellites shall ensure compliance with the equivalent power flux-density limitations specified in Article 22 of the ITU Radio Regulations.”**

- A1.6 In Schedule 1(4) the reference to Geostationary will be removed for 4(d). 4(e) and 4(f) will be amended to reflect that they relate to GSO systems only:

- “d) Transmissions from the Radio Equipment shall automatically be terminated on loss or significant degradation of the downlink signal from the relevant **Geostationary** Satellite.
- e) **For operation with Geostationary Satellites**, the Radio Equipment shall employ a stabilised platform with the ability to maintain a pointing accuracy +/-0.2 degrees towards the relevant Geostationary Satellite throughout transmissions.
- f) **For operation with Geostationary Satellites**, the maximum EIRP at angles greater than or equal to 2.5 degrees from the antenna main beam axis shall not exceed 20 dBW/40 kHz from any individual station.

¹¹ITU Radio Regulations Article 22 – Space Services: http://www.itu.int/dms_pub/itu-s/oth/02/02/S02020000244501PDFE.PDF (Page 271)

A1.7 In Schedule 1(7) a new interpretation will be added to define “Non-Geostationary Satellite”:

c. “Non-Geostationary Satellite” means a satellite that does not remain fixed relative to a position on the surface of the earth.

A1.8 In Schedule 2 a reference to the Satellite Type (GSO or NGSO) will be added; Orbital longitude will be updated to reflect that it only applies to GSO use and the frequency bands for each service type will be identified as illustrated in Figure 1 below.

Figure 1: Updates made to Schedule 2 to permit NGSO use



SCHEDULE 2

Licence No	<Lic_No>	Licence version date	<Date>	Payment Interval	1 year
VSAT Network Name			Emergency Telephone Number (24 Hours)		
<Network_name>			<Emergency_telephone>		
Network Type	Satellite Type	Satellite Name	GSO Orbit Long (Degs)		
<Network_type>	<GSO/NGSO>	<Sat_name>	[Orbit Long]		

Frequency band
14.0 – 14.25 GHz 27.5 – 27.8185 GHz 28.4545 – 28.8265 GHz 29.4625 – 30 GHz (GSO) 29.5 – 30 GHz (NGSO)

Operations are subject to the provision of Article 4.4 of the ITU Radio Regulations (non-interference basis to users of this spectrum) prior to International Co-ordination

A1.9 A revised licence illustrating these changes is attached in Annex 2.

Modification to the Satellite (Non-Geostationary Earth Station) licence

A1.10 A licensing product is already available to enable the operation of fixed-sited, coordinated NGSO earth stations. This product is the Satellite (Non-Geostationary Earth Station) licence. Details relating to this licence product are available on the Ofcom website¹². This licence product will be modified to include the epcf requirements to standardise the requirements across both this and the Satellite (Earth Station Network) licence.

A1.11 These licences are already available to cover operation of fixed-sited, coordinated earth stations in the UK in frequency bands designated for the non-geostationary operations and assigned for Earth-to-Space transmission.

A1.12 A non-geostationary earth station can only operate from one known, fixed, terrestrial UK location. Frequency bands that are licensed for transmission in the UK for these

¹² <http://licensing.ofcom.org.uk/radiocommunication-licences/satellite-earth/>

services are detailed in the Ofcom Frequency Allocation Table¹³, and in The Wireless Telegraphy (Limitation of Number of Licences) Order 2014¹⁴.

A1.13 In modifying the Satellite (Non-Geostationary Earth Station) licence the following changes will be made:

A1.14 In Schedule 1(1) the term Non-Geostationary satellites will be included to clarify which type of satellites the earth station can operate with:

“1. The Licensee may establish and use:

A Permanent sending and receiving Earth Station ("the Station") at the location specified in the attached schedule for the purpose of providing Wireless Telegraphy links between the Station and **Non-Geostationary Satellite(s)**.

A1.15 In Schedule 1(2) Emission Code will be editorially updated and Equivalent Isotropically Radiated Power will be deleted and replaced with Antenna I/P Power:

“2. Limitations on use.

The Station shall use only :

- a) the classes of emission specified in the ~~Designation of~~ **Emission Code** column of the attached schedule;
- b) the frequencies specified in the Transmit Frequency and Receive Frequency columns of the schedule;
- c) A power not exceeding that specified in the **Antenna I/P Power** ~~Equivalent Isotropically Radiated Power~~ column of the schedule;
- d) the antenna type specified in the Antenna Type column of the schedule;
- e) a power density not exceeding that specified in the Spectral Power Density column of the schedule;
- f) the Station shall be operated only from the location specified on the schedule.

A1.16 In Schedule 1(3) editorial changes will be made to aid clarity and two new conditions added (3(d) and 3(g)). 3(d) will be included to standardise the conditions in both this licence product and the Satellite (Earth Station Network) licence. This condition is to ensure the earth stations operating with NGSO satellites comply with Article 22 of the ITU Radio Regulations in relation to the control of interference to geostationary-satellite systems. 3(g) will be added to highlight the limited use of the band 29.1 – 29.5 GHz by NGSO as stated in ITU Radio Regulations 5.535A:

¹³ <http://stakeholders.ofcom.org.uk/spectrum/information/uk-fat/>

¹⁴ http://www.legislation.gov.uk/uksi/2014/774/pdfs/uksi_20140774_en.pdf

“3. Apparatus

The Licensee shall ensure that:

- a) the apparatus comprised in the station (“the Apparatus”) is so designed constructed, maintained and operated, that it does not cause any undue interference to other users of the spectrum;
- b) the Apparatus complies with (and is maintained in accordance with) the relevant performance specification(s) published by the operator of the Satellite;
- c) the earth station antenna shall not be employed for transmission at elevation of less than 3 degrees measured from the horizontal plane to the direction of maximum radiation as specified in **Article 21.14 of the ITU Radio Regulations** ~~ITU—RR ART.21.14~~;
- d) The earth stations operating with Non-Geostationary Satellites shall ensure compliance with the equivalent power flux-density limitations specified in Article 22 of the ITU Radio Regulations;**
- e) the component of effective isotropic radiated power directed towards the horizon and the minimum elevation angle above the horizontal must comply with ITU Radio Regulations and not exceed those limits specified in **Articles 21.8 – 21.15 of the ITU Radio Regulations** ~~ITU—RR ART. 21.8—ART. 21.15~~;
- f) in the band 13.75 GHz – 14 GHz, that earth stations with an antenna diameter of less than 4.5m operate in compliance with the pfd limits in ITU Radio Regulations 5.502, that the e.i.r.p. of any emission from an earth station in the fixed satellite service does not exceed 85 dBW and that the e.i.r.p. density of emissions in the band 13.77 – 13.78 GHz complies with ITU Radio Regulations 5.503;
- g) Use of the band 29.1 – 29.5 GHz shall be in compliance with ITU Radio Regulations 5.535A;**
- h) the apparatus used for transmission complies with the R&TTE Directive and all appropriate National Interface Requirements for Satellite Earth Stations in force within the UK;
- i) the Antenna Radiation Pattern Envelope meets the minimum performance specified by the operator of the Satellite.

Where appropriate, Ofcom may require that the Licensee provide additional screening at the installation as a condition of the licence.

A1.17 A revised licence illustrating these changes is attached in Annex 3

Extension of the Ships Radio Licence Notice of Variation for ESVs

- A1.18 In extending the flexibility of the Notice of Variation for ESVs to the Ship Radio licence to permit the use of NGSO satellite networks the following changes will be made.
- A1.19 In Section 2(a) the reference to Non-Geostationary satellites will be included to clarify the applicable licence product types:
- “(a) Sending and receiving Earth Station(s) on board a vessel (“ESV”) for the purpose of providing wireless telegraphy links between the ESV and Geostationary **or Non-Geostationary** Satellite(s).”
- A1.20 In Section 4 editorial changes will be made to aid clarity and a new condition added (4(d)). 4(d) will standardise the conditions in both this licence product and the Satellite (Earth Station Network) licence. This condition is to ensure the NGSO network complies with Article 22 of the Radio Regulations in relation to the control of interference to geostationary-satellite systems. Additionally 4(i) and 4(j) will be updated to reflect that they only apply to earth stations operating with GSO satellites:
- “(d) **The earth stations operating with Non-Geostationary Satellites shall ensure compliance with the equivalent power flux-density limitations specified in Article 22 of the ITU Radio Regulations.**
- (i) The antennas **of earth stations operating with Geostationary Satellites shall meet the minimum performance specified** ~~in operate in accordance with~~ Recommendation ITU-R S.580-6.
- (j) **For operation with Geostationary Satellites**, the ESV shall employ a stabilised platform with the ability to maintain a pointing accuracy ± 0.2 degrees towards the Geostationary Satellite throughout transmissions.”
- A1.21 In Section 5 editorial changes will be made to aid clarity and a new interpretation at 5(c) will be added to define “Non-Geostationary Satellite”:
- “(c) **Non-Geostationary Satellite” means a satellite that does not remain fixed relative to a position on the surface of the earth”.**
- A1.22 A revised notice of variation illustrating these changes is attached at Annex 4.

Extensions of the Ships Radio Licence Notice of Variation for ESOMPs

- A1.23 In extending the flexibility of the Notice of Variation for ESOMPs to the Ships Radio licence to permit the use of NGSO satellite networks the following changes will be made.
- A1.24 In Section 3 the term ‘Non-Geostationary Satellites’ will be included to aid clarity of the applicable licence product types and several conditions included to identify the geographic restrictions and use of specific frequency bands applicable to NGSO use:

- “(b) Within the territorial sea of the UK, the Channel Islands¹⁵ or the Isle of Man, the licensee may operate the Radio Equipment **operating with Geostationary Satellites** only in the frequency bands identified below:
- i) 27.5 – 27.8185 GHz, 28.4545 – 28.8265 GHz and 29.4625 – 30 GHz transmission (Earth-to-space)
 - ii) 17.3 – 20.2 GHz for reception (space-to-Earth)
- (c) **Within the territorial sea of the UK, the Channel Islands or the Isle of Man, the licensee may operate the Radio Equipment operating with Non-Geostationary Satellites only in the frequency bands identified below:**
- i) **27.5 – 27.8185 GHz, 28.4545 – 28.8265 GHz and 29.5 – 30 GHz for transmission (Earth-to-space)**
 - ii) **17.3 – 20.2 GHz for reception (space-to-Earth)**
- (d) Outwith the territorial sea of the UK, the Channel Islands and the Isle of Man, the licensee may operate the Radio Equipment **operating with Geostationary Satellites** in any part of the frequency band 27.5– 30 GHz;
- (e) **Outwith the territorial sea of the UK, the Channel Islands and the Isle of Man, the licensee may operate the Radio Equipment operating with Non-Geostationary Satellites in any part of the frequency bands 27.5 – 29.1 GHz and 29.5 – 30 GHz;”**

A1.25 Section 4 will be included to standardise the conditions in both this licence product and the Satellite (Earth Station Network) licence. This condition is to ensure the NGSO network complies with Article 22 of the ITU Radio Regulations in relation to the control of interference to geostationary-satellite systems:

“The earth stations operating with Non-Geostationary Satellites shall ensure compliance with the equivalent power flux-density limitations specified in Article 22 of the ITU Radio Regulations.”

A1.26 In Section 6, definitions will be added to define “Geostationary” and “Non-Geostationary Satellite”:

“(b) “Geostationary Satellite” means a satellite in geostationary orbit which remains approximately in a fixed position relative to a position on the surface of the earth;

(c) “Non-Geostationary Satellite” means a satellite that does not remain fixed relative to a position on the surface of the earth”

A1.27 A revised notice of variation illustrating these changes is attached at Annex 5

¹⁵ The Bailiwick of Jersey and the Bailiwick of Guernsey

Annex 2

Satellite (Earth Station Network) Licence



Wireless Telegraphy Act 2006

Satellite (Earth Station Network)

Sector/class/product	<Product>
Licence number	<Lic_No>
Licensee	<Lic_Name>
Licensee address	<Address>
Licence first issue date	<Issue_Date>
Licence version date	<Date>
Payment interval	<Year>

1. This Licence is issued by the Office of Communications ("Ofcom") on **<Date>** and replaces any previous authority granted in respect of the service subject to this Licence by Ofcom or by the Secretary of State.
2. This Licence authorises **<Lic_Name>** ("the Licensee") to establish, install and/or use radio transmitting and/or receiving stations and/or radio apparatus as described in the schedule(s) (hereinafter together called "the Radio Equipment") subject to the terms set out below and subject to the terms of the General Licence Conditions booklet. (Version OF195. 1).

ISSUED BY OFCOM

SATELLITE (EARTH STATION NETWORK) LICENCE

SCHEDULE 1 TO LICENCE NUMBER <Lic_No>

TERMS, PROVISIONS AND LIMITATIONS COVERED BY THIS LICENCE

This schedule forms part of Licence <Lic_No>, issued to <Lic_Name>, the Licensee on <Date>, and describes the terms and equipment specifications covered by this licence.

1. The Licensee may establish and use:

Permanent, transportable or mobile sending and receiving Network Earth Station(s) ("the Station(s)") for the purpose of providing Wireless Telegraphy links between the Station(s) and Geostationary or Non-Geostationary Satellite(s).

2. Limitations on use

The Stations(s) operating with Geostationary Satellites shall:

- a) transmit within one or more of the following frequency ranges: 14.0-14.25 GHz, 27.5 - 27.8185 GHz, 28.4545 - 28.8265 GHz, 29.4625 - 30 GHz;
- b) transmit only to the satellite and its associated orbital longitude specified in Schedule.

Land Station(s) operating with Non-Geostationary Satellites shall:

- c) transmit within one or more of the following frequency ranges: 14.0-14.25 GHz, 27.5 - 27.8185 GHz, 28.4545 - 28.8265 GHz, 29.5 - 30 GHz;
- d) transmit only to the satellite network specified in Schedule 2;

Aeronautical Station(s) operating with Non-Geostationary Satellites shall:

- e) transmit within the frequency range 14.0-14.25 GHz;
- f) transmit only to the satellite network specified in Schedule 2.

Additionally:

- g) stations(s) that transmit with e.i.r.p. greater than 55 dBW shall operate only with prior consent from Ofcom and registration of the station(s) against the licence;
- h) station(s) that transmit within the frequency range 14.0 - 14.25 GHz inclusive shall not operate at any location that is less than or equal to 5 km from the two geographical locations specified in Schedule 3 without prior consent from Ofcom and registration of the station(s) against the licence;
- i) station(s) that transmit with e.i.r.p. greater than 50 dBW and less than 55 dBW (50 dBW < e.i.r.p. < 55 dBW) in the frequency range 14.0 - 14.25 GHz inclusive shall not operate at any location that is greater than 5 km and less than or equal to 7 km from the two geographical locations specified in Schedule 3 without prior consent from Ofcom and registration of the station(s) against the licence; and

- j) station(s) shall not operate within the perimeter fence of any of the aerodromes specified in Schedule 4 without prior consent from the Civil Aviation Authority or stated Airport Authority.

3. Apparatus

The Licensee shall ensure that:

- a) The apparatus comprised in the Station(s) ("the Apparatus") is so designed, constructed, maintained and operated, that its use does not cause any undue interference to other users of the spectrum.
- b) The apparatus complies with (and is maintained in accordance with) the relevant performance specification(s) published by the operator(s) of the Geostationary or Non-Geostationary Satellite(s)
- c) The earth stations operating with Non-Geostationary Satellites shall ensure compliance with the equivalent power flux-density limitations specified in Article 22 of the ITU Radio Regulations.
- d) The apparatus used for transmission complies with the R&TTE Directive and the appropriate UK National Interface Requirements.

4. Additional conditions for mobile operation

- a) The Radio Equipment shall be established or installed so that transmissions from the Radio Equipment may only be made when the Radio Equipment's operation is enabled by the crew of the vehicle, aircraft or train upon which it is mounted, and under the operational control of the Network Control Facility. The Radio Equipment shall provide the crew with a means immediately to terminate transmissions.
- b) Where an aircraft is registered in the United Kingdom, Channel Islands or the Isle of Man, the Licensee shall ensure that all Radio Equipment on board that aircraft is endorsed by either a separate licence or exemption under the Wireless Telegraphy Act 2006.
- c) The Radio Equipment installed on an aircraft shall not be permitted to operate when the aircraft is below 7000 feet altitude, or operate during take-off, initial climb-out, final approach, landing or taxiing, unless specifically authorised by the CAA.
- d) Transmissions from the Radio Equipment shall automatically be terminated on loss or significant degradation of the downlink signal from the relevant Satellite.
- e) For operation with Geostationary Satellites, the Radio Equipment shall employ a stabilised platform with the ability to maintain a pointing accuracy +/-0.2 degrees towards the relevant Geostationary Satellite throughout transmissions.
- f) For operation with Geostationary Satellites, the maximum EIRP at angles greater than or equal to 2.5 degrees from the antenna main beam axis shall not exceed 20 dBW/40 kHz from any individual station.

5. National and international obligations

- a) The relevant satellite data shall have been submitted to ITU in accordance with established ITU procedures.
- b) All transmissions in the Fixed Satellite Service must be terminated prior to any change of location; unless the apparatus used for transmission is designed for mobile operation and incorporates a stabilised platform or is operating under a specific exemption authorised by Ofcom.

6. Requirements specific to Satellite (Earth Station Network) Licences

- a) The Licensee shall keep a record of the operational characteristics of all terminals in the network, including the locations of fixed installations or, for mobile operation, details of the vehicles, aircraft or trains on which the terminals are installed and the associated route or defined area of operation, which Ofcom may wish to have access to for enforcement purposes.
- b) Terminals that are included as part of a Network Licence shall implement independent local control and monitoring functions at the terminal, and be authorised, supervised and administered by a Network Control and Monitoring centre.
- c) The Licensee shall have the facility to disable individual terminal transmission.
- d) For satellite networks in MESH configuration, the network operator must nominate and notify Ofcom of those earth station(s) located in the UK which have independent centralised control and monitoring functionality and possess the capability to suppress transmissions from any earth station within the network. Earth stations that are capable of dynamic assignment as point-to-multipoint and point-to-point configuration may only be licensed as permanent earth stations.

7. Interpretation

In this and subsequent schedule(s):

- a) "Earth Station" means a radio transmitter located on the surface of the earth or mounted on a vehicle or train and intended for communication with one or more satellites.
- b) "Geostationary Satellite" means a satellite in geostationary orbit which remains approximately in a fixed position relative to a position on the surface of the earth.
- c) "Non-Geostationary Satellite" means a satellite that does not remain fixed relative to a position on the surface of the earth.

Notes

1. This Licence does not affect the requirement, when necessary, to obtain licences or authorisations under other Acts, such as the Broadcasting Act.
2. Some terminal installations require Local Authority Planning Approval. Advice should be sought from the Department for Business, Enterprise and Regulatory Reform and the appropriate Local Authority planning department.
3. The licensee must apply for a variation of the licence from Ofcom before making any changes which may contravene the conditions of the licence.
4. Technical terms used in clause 2 shall have the meanings assigned to them in the ITU Radio Regulations.
5. For Radio Equipment installed on aircraft, licensees are advised that they must comply with Civil Aviation Authority (CAA) airworthiness requirements and regulations.
6. Further information, in respect of airworthiness requirements and certification requirements before installation, can be obtained by contacting the Civil Aviation Authority (CAA):

Civil Aviation Authority

CAA House
45-59 Kingsway
London
WC2B 6TE

Tel: 020 7379 7311

<http://www.caa.co.uk/>



SCHEDULE 2

Licence No	<Lic_No>	Licence version date	<Date>	Payment Interval	1 year
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VSAT Network Name	Emergency Telephone Number (24 Hours)
<Network_name>	<Emergency_telephone>

Network Type	Satellite Type	Satellite Name	GSO Orbit Long (Degs)
<Network_type>	<GSO/NGSO>	<Sat_name>	[Orbit Long]

Frequency band
14.0 – 14.25 GHz 27.5 – 27.8185 GHz 28.4545 – 28.8265 GHz 29.4625 – 30 GHz (GSO) 29.5 – 30 GHz (NGSO)

Operations are subject to the provision of Article 4.4 of the ITU Radio Regulations (non-interference basis to users of this spectrum) prior to International Co-ordination

SCHEDULE 3

Restrictions on equipment to be located within 7 km of the following National Grid References apply - see Schedule 1, Sections 2 h) and i) for further details.

SE 20900 56100
SS 20500 12600

SCHEDULE 4

Permission to operate equipment subject to this licence from any location within the perimeter fence of the aerodromes listed below must be obtained from either the CAA or the Airport Authority.

CAA Contact: 0207 453 6531

Aerodrome name	Address	Postcode	Tephone	UK/CI/NI	Easting	Northing	Aerodrome POC
Aberdeen / Dyce	Aberdeen Airport	AB21 7DU	01224 723714	UK	387997	812609	Duty Tels Officer
Alderney	Alderney Airport	GY9 3AJ	01481 822851	CI	556723	5506468	Senior Air Traffic Controller
Belfast Aldergrove	Belfast International Airport	BT29 4AB	028 9448 4281	NI	315195	380283	Duty Air Traffic Engineer
Belfast City	Belfast City Airport	BT3 9JH	028 9045 4871	NI	337483	376510	ATC Supervisor
Benbecula	Benbecula Aerodrome	HS7 5LA	01870 602051	UK	78483	855733	Senior Air Traffic Controller
Biggin Hill	Biggin Hill Airport	TN16 3BN	01959 574677	UK	541691	161064	ATS Manager
Birmingham	Birmingham International Airport	B26 3QJ	0121 780 0922	UK	417220	284022	Duty Engineering Officer
Blackpool	Blackpool Airport	FY4 2QY	01253 343434	UK	332307	431071	Senior Telecommunications Officer
Bournemouth	Bournemouth International Airport	BH23 6SE	01202 364150	UK	411201	97844	ATS Manager
Bristol	Bristol Aiport	BS48 3DY	08701 212747	UK	350055	165098	Air Traffic Engineering Manager
Cambridge	Cambridge Airport	CB5 8RX	01223 293737	UK	548723	258544	Senior Air Traffic Controller
Cardiff	Cardiff International Airport	CF62 3BD	01446 712562	UK	306643	167265	Duty Engineering Officer
Carlisle	Carlisle Airport	CA6 4NW	01228 573629	UK	348265	560609	Senior Telecommunications Officer
Coventry	Coventry Airport	CV8 3AZ	02476 308638	UK	435519	274761	Senior Air Traffic Engineer
Cranfield	Cranfield Aerodrome	MK43 0AL	01234 754761	UK	494909	242446	Manager ATS
Dundee	Dundee Airport	DD2 1UH	01382 643242	UK	336868	729382	Senior Air Traffic Controller
Doncaster/Sheffield	Robin Hood Airport	DN9 3RH	01302 624870	UK	46603	39807	ATC Manager
East Midlands	East Midlands Airport	DE74 2SA	01332 852910	UK	445367	326168	Duty Engineering Officer
Edinburgh	Edinburgh Airport	EH12 9DN	0131 317 7638	UK	314389	673842	Duty Air Traffic Engineer
Exeter	Exeter Airport	EX5 2BD	01392 367433	UK	300326	93702	Senior Air Traffic Controller
Farnborough	Farnborough Airport	GU14 6XA	01252 526015	UK	485452	153678	Senior Air Traffic Controller
Filton	Filton Aerodrome	BS99 7AR	0117 969 9094	UK	359103	180229	Senior Air Traffic Controller

Aerodrome name	Address	Postcode	Tephone	UK/CI/NI	Easting	Northing	Aerodrome POC
Glasgow	NATS, Control Tower	PA3 2SG	0141 840 8029	UK	247869	666993	Manager Engineering
Gloucestershire	Gloucestershire Aerodrome	GL51 6SR	01452 857700	UK	388598	221747	Duty Aerodrome Controller
Guernsey	Guernsey Airport	GY8 0DJ	01481 237766	CI	528960	5476102	Senior Air Traffic Controller
Hawarden	Hawarden Airport	CH4 0DR	01244 522012	UK	334748	364998	Senior Air Traffic Controller
Humberside	Humberside Airport	DN39 6YH	01652 682022	UK	509295	409914	Air Traffic Manager
Inverness	Inverness Airport	IV2 7JB	01667 464293	UK	277380	851836	ATC Inverness
Isle of Man	Isle of Man Airport	IM9 2AS	01624 821600	UK	228463	468452	Senior Air Traffic Engineer
Jersey	Jersey Airport	JE1 1BW	01534 492226	CI	558699	5451100	Senior Air Traffic Controller
Kirkwall	Kirkwall Airport	KW15 1TH	01856 886205	UK	348020	1008196	Senior Air Traffic Controller
Lands End / St Just	Lands End Aerodrome	TR19 7RL	01736 788944	UK	137630	28983	Senior Air Traffic Controller
Leeds Bradford	Leeds Bradford International Airport	LS19 7TU	0113 391 3277	UK	422418	441129	Duty Air Traffic Engineer
Liverpool	Liverpool Airport Plc	L24 1YD	0151 288 4300	UK	343507	382196	Senior Air Traffic Controller
London City	London City Airport	E16 2PX	020 7646 0205	UK	542674	180487	Duty Air Traffic Engineer
London Gatwick	London (Gatwick) Airport	RH6 0NP	01293 601060	UK	526676	140318	Duty Air Traffic Engineer
London Luton	London Luton Airport	LU2 9LY	01582 395029	UK	512422	220804	Duty Air Traffic Engineer
London Stansted	London Stansted Airport	CM24 1QW	01279 669316	UK	553916	223081	Duty Air Traffic Engineer
Londonderry /Eglinton	City of Derry Airport	BT47 3PY	028 7181 1099	NI	253681	422039	Senior Air Traffic Engineer
Manchester	Manchester Airport	M90 1QX	0161 499 5025	UK	381796	384132	Duty Air Traffic Engineer
Manchester Woodford	Manchester Woodford	SK7 1QR	0161 439 3383	UK	390174	382355	Senior Air Traffic Controller
Manston	Kent International Airport	CT12 5BP	01843 825063	UK	633140	165662	Senior Air Traffic Controller
Newcastle	Newcastle Airport	NE13 8BZ	0191 214 3244	UK	419802	571483	Senior Air Traffic Controller
Northolt	RAF Northolt	HA4 6NG	020 8833 8228	UK	509755	184987	Air Traffic Supervisor
Norwich	Norwich Airport	NR6 6JA	01603 420645	UK	622014	313753	Tels/Engineering
Oxford/ Kidlington	Oxford Airport	OX5 1RA	01865 844272	UK	446949	215594	Senior Air Traffic Controller
Pembrey	Pembrey Airport	SA16 0HZ	01554 891534	UK	240360	204220	Senior Air Traffic Controller
Plymouth	Plymouth City Airport	PL6 8BW	01752 515341	UK	250511	60229	Senior Air Traffic Controller

Aerodrome name	Address	Postcode	Tephone	UK/CI/NI	Easting	Northing	Aerodrome POC
Prestwick	Glasgow Prestwick International Airport	KA9 2PL	01292 511107	UK	236746	626815	Senior Air Traffic Controller
Redhill	Terminal Building	RH1 5YP	01737 823377	UK	530105	147698	Senior Air Traffic Controller
Scatsta	Scatsta Aerodrome	ZE2 9QP	01806 242791	UK	438844	1172284	Senior Air Traffic Controller
Scilly Isles / St Marys	St Mary's Airport	TR21 0NG	01720 422677	UK	92020	10300	Senior Air Traffic Controller
Shoreham	Shoreham Airport	BN4 5FJ	01273 467377	UK	519999	105406	Senior Air Traffic Controller
Southampton	Southampton Airport	SO18 2NL	023 8062 7113	UK	445278	116962	Duty Air Traffic Engineer
Southend	London Southend Airport	SS2 6YF	01702 608120	UK	586898	189290	Senior Air Traffic Controller
Stornoway	Stornoway Aerodrome	HS2 0BN	01851 707415	UK	145851	933141	Senior Air Traffic Controller
Sumburgh	Sumburgh Airport	ZE3 9JP	01950 460173	UK	439533	1110613	Senior Air Traffic Controller
Swansea	Swansea Aerodrome	SA2 7JU	01792 204063	UK	256904	191635	Senior Air Traffic Controller
Teeside	Teeside International Airport Ltd	DL2 1LU	01325 332811	UK	437041	512801	Senior Air Traffic Controller
Warton	British Aerospace	PR4 1AX	01772 852374	UK	341805	427980	Senior Air Traffic Controller
Wick	Wick Aerodrome	KW1 4QP	01955 602215	UK	336317	952799	Senior Air Traffic Controller
Wolverhampton	Wolverhampton Aerodrome	DY7 5DY	01384 221378	UK	382473	291103	Senior Air Traffic Controller
Wycombe Air Park / Booker	Wycombe Air Park	SL7 3DP	01494 529261	UK	482630	190993	Senior Air Traffic Controller
Yeovil / Westland	Yeovil Aerodrome	BA20 2YB	01935 475222	UK	353823	115831	Senior Air Traffic Controller

Annex 3

Satellite (Non-Geostationary Earth Station) licence



Wireless Telegraphy Act 2006

Satellite (Non-Geostationary Earth Station)

Sector/class/product	<Product>
Licence number	<Lic_No>
Licensee	<Lic_Name>
Licensee address	<Address>
Licence first issue date	<Issue_Date>
Licence version date	<Date>
Payment interval	<Year>

1. This Licence is issued by the Office of Communications ("Ofcom") on **<Date>** and replaces any previous authority granted in respect of the service subject to this Licence by Ofcom or by the Secretary of State.
2. This Licence authorises **<Lic_Name>** ("the Licensee") to establish, install and/or use radio transmitting and/or receiving stations and/or radio apparatus as described in the schedule(s) (hereinafter together called "the Radio Equipment") subject to the terms set out below and subject to the terms of the General Licence Conditions booklet. (Version OF195.1).

ISSUED BY OFCOM

Satellite (Non-Geostationary Earth Station)

SCHEDULE 1 TO LICENCE NUMBER <Lic_No>

TERMS, PROVISIONS AND LIMITATIONS COVERED BY THIS LICENCE

This schedule forms part of Licence <Lic_No>, issued to <Lic_Name>, the Licensee on <Date>, and describes the terms and equipment specifications covered by this licence.

1. The Licensee may establish and use:

A Permanent sending and receiving Earth Station (" the Station") at the location specified in the attached schedule for the purpose of providing Wireless Telegraphy links between the Station and Non-Geostationary Satellite(s).

2. Limitations on use

The Station shall use only:

- a) the classes of emission specified in the Emission Code column of the attached schedule;
- b) the frequencies specified in the Transmit Frequency and Receive Frequency columns of the schedule;
- c) A power not exceeding that specified in the Antenna I/P Power column of the schedule;
- d) the antenna type specified in the Antenna Type column of the schedule;
- e) a power density not exceeding that specified in the Spectral Power Density column of the schedule;
- f) the Station shall be operated only from the location specified on the schedule.

3. Apparatus

The Licensee shall ensure that:

- a) the apparatus comprised in the station ("the Apparatus") is so designed constructed, maintained and operated, that it does not cause any undue interference to other users of the spectrum;
- b) the Apparatus complies with (and is maintained in accordance with) the relevant performance specification(s) published by the operator of the Satellite;
- c) the earth station antenna shall not be employed for transmission at elevation of less than 3 degrees measured from the horizontal plane to the direction of maximum radiation as specified in Article

21.14 of the ITU Radio Regulations;

- d) The earth stations operating with Non-Geostationary Satellites shall ensure compliance with the equivalent power flux-density limitations specified in Article 22 of the ITU Radio Regulations;
- e) the component of effective isotropic radiated power directed towards the horizon and the minimum elevation angle above the horizontal must comply with ITU Radio Regulations and not exceed those limits specified in Articles 21.8 – 21.15 of the ITU Radio Regulations;
- f) in the band 13.75 GHz – 14 GHz, that earth stations with an antenna diameter of less than 4.5m operate in compliance with the pfd limits in ITU Radio Regulations 5.502, that the e.i.r.p. of any emission from an earth station in the fixed satellite service does not exceed 85 dBW and that the e.i.r.p. density of emissions in the band 13.77 – 13.78 GHz complies with ITU Radio Regulations 5.503;
- g) Use of the band 29.1 – 29.5 GHz shall be in compliance with ITU Radio Regulations 5.535A;
- h) the apparatus used for transmission complies with the R&TTE Directive and all appropriate National Interface Requirements for Satellite Earth Stations in force within the UK;
- i) the Antenna Radiation Pattern Envelope meets the minimum performance specified by the operator of the Satellite;

Where appropriate, Ofcom may require that the Licensee provide additional screening at the installation as a condition of the licence.

4. National and international obligations

- a) The earth station must undergo national coordination and site clearance for operation at the specified location.
- b) The relevant satellite data shall have been submitted to ITU in accordance with established ITU procedures.
- c) All transmissions in the Fixed Satellite Service must be terminated prior to any change of location; unless operating under a specific exemption authorised by Ofcom.
- d) The Licensee shall comply with any notice given by Ofcom under section 9A of the Wireless Telegraphy Act 2006 requiring the licensee to cease or suspend the uplinking by means of the licensed apparatus of any service specified in such notice by such date as may be specified.
- e) The licensee shall provide such information as Ofcom may request by notice in writing for the purpose of determining whether section 9A of the Wireless Telegraphy Act 2006 applies in relation to a service for which the licensee provides uplink facilities using the licensed apparatus or for any purpose connected with the giving of a notice by Ofcom under section 9A of the Act.

5. Interpretation

In this and subsequent schedule(s):

- a) "Earth Station" means a radio transmitter located on the surface of the earth and intended for communication with one satellite.
- b) "Non-Geostationary Satellite" means a satellite that does not remain fixed relative to a position on the surface of the earth.
- c) "Uplink" and any cognate expression refers to a transmission in the Earth-to-space direction

Notes

1. This Licence does not affect the requirement, where necessary, to obtain licences or authorisations under other Acts. Some satellite television or radio broadcasting services also require licences under the Broadcasting Act 1990, and some installations require Local Authority Planning Approval.

Advice should be
sought from: Ofcom
Riverside House
2a Southwark
Bridge Road
London
SE1 9HA
Switchboard: 020 7981 3000
Fax: 020 7981 3333

<<http://www.ofcom.org.uk/tv/ifi/tvlicensing/>>

<<http://www.ofcom.org.uk/radio/ifi/>>

And the appropriate Local Authority planning department.

2. The Licensee must apply for a variation of the Licence from Ofcom before making any changes which may contravene the Licence.
3. Technical terms used in clause 2 shall have the meanings assigned to them in the ITU Radio Regulations.

SCHEDULE 2

Licence No	<Lic_No>	Licence version date	<Date>	Payment Interval	1 year
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Licensing Centre Point	<LCP_NGR >
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Earth Station Deployment	Earth Station Name	Earth Station NGR
<ES_Deploy_No>	<ES_Name>	<ES_NGR>

			Transmit		Receive		
Antenna Centre Height	Antenna Type	Dish Size	Tx Gain (dBi)	Tx Beamwidth (deg)	Rx Gain (dBi)	Rx Beamwidth (deg)	System Noise Temperature
<antenna height AGL>	<antenna type>	<dish size>	<tx gain>	<tx beamwidth>	<rx gain>	<rx beamwidth>	<Syst_noise_temp >

Satellite Name	ES Azimuth from (deg)	ES Azimuth to (deg)	ES minimum Elevation (deg)	ES maximum Elevation (deg)
<sat name>	<es_azimuth_from>	<es_azimuth_to>	<es_elevation_min>	<es_elevation_max>

Transmit Frequency	Receive Frequency	Associated Authorised Bandwidth (MHz)	Associated Emissions
<tx-1>		<bandwidth>	A
	<rx-1>	<bandwidth>	B

Emission reference code	Emission Type	Emission Code	Polarisation	Antenna I/P Power (dBW)	Spectral Power Dens (dBW/Hz)
A	<em_type>	<em_code>	<polarization>	<antenna IP power>	<spectral Power Den>
B	<em_type>	<em_code>	<polarization>	<antenna IP power>	<spectral Power Den>

Annex 4

Ships Radio Licence Notice of Variation for ESVs



WIRELESS TELEGRAPHY ACT 2006

**NOTICE OF VARIATION OF SHIP RADIO LICENCE FOR THE PURPOSE
OF THE INSTALLATION AND USE OF A SATELLITE EARTH STATION
ON BOARD A VESSEL (ESV)**

Ofcom, in exercise of the power conferred by Schedule 1, paragraph 6 of the Wireless Telegraphy Act 2006 (“the Act”), in accordance with Schedule 1, paragraph 7 of the Act, hereby varies the Ship Radio Licence granted to:

Name of Licensee or Organisation

on:

Date of issue of Licence

in respect of the vessel identified below:

Vessel name	
Licence No.	
Call Sign	
MMSI No.	
Date of Issue of this Notice of Variation:	

- 1 Terms and expressions defined in the Licence shall have the same meaning herein except where the context requires otherwise.

- 2 As and from the Date of Issue of this Notice of Variation, the Licence shall be varied so that the following radio equipment may, in addition to that already set out in the Licence, be established, installed and used on the vessel named above subject to the terms set out in the Ship Radio Licence as varied by paragraphs 3 to 7 below:
 - (a) Sending and receiving Earth Station(s) on board a vessel

(“ESV”) for the purpose of providing wireless telegraphy links between the ESV and Geostationary or Non-Geostationary Satellite(s).

- (b) The radio equipment described in paragraph 2(a) above shall be read as an integral part of the Licence and the following additional terms shall apply in respect of the establishment, installation and use of this radio equipment.

3 The terms of the Licence set out in the Ship Radio Licence are varied in their application to the Licensee only in respect of the establishment, installation and use of the radio equipment described in paragraph 2(a) above as follows:

- (a) Paragraph 5 of Schedule 1 shall be deleted and replaced as follows:

“5 The Licensee shall use the following method of identification for all transmissions:

- (i) the ESV terminal identity number.”

- (b) Paragraph 10 of Schedule 1 shall be deleted and replaced as follows:

“10 Maritime radio equipment used on board ships shall only be used on ship frequencies within the frequency bands indicated below:

ESV (Earth-to-space) operation limited to 14.00 – 14.25* GHz for transmission

ESV (space-to-Earth) operation limited to 10.70 – 11.70 GHz for reception

ESV (space-to-Earth) operation limited to 12.50 – 12.75 GHz for reception

* ESV terminals may transmit in the band 14.25 to 14.5 GHz (Earth to space) when more than 125 km from the coast of the UK or the coast of UK Overseas Territories in accordance with ITU Resolution 902 (WRC-03).”

4. The following additional terms shall apply in respect of the establishment, installation and use of the radio equipment described in paragraph 2(a) above, and shall be read as an integral part of the Licence for this purpose:

- (a) The ESV shall be operated on a “Non-Interference Non-Protected” basis; that is, the ESV shall not cause harmful interference to, and shall not claim protection from, other stations operating in accordance with Article 5 of the ITU Radio Regulations.

- (b) The ESV shall not be permitted to operate when the vessel is within:

500m of an off-shore installation, if by Order in Council, that off- shore installation is to be treated as part of the UK territorial

seas.

Within 5 km of N50:53:06, W04:35:55 - North Cornish Coast
Morwenstow.

- (c) The ESV shall comply with the appropriate essential requirements identified in Article 3 of the R&TTE Directive and other relevant provisions of that Directive.
- (d) The earth stations operating with Non-Geostationary Satellites shall ensure compliance with the equivalent power flux-density limitations specified in Article 22 of the ITU Radio Regulations.
- (e) The ESV shall comply with IEC 60945, published in August 2002 by the International Electrotechnical Commission, the relevant requirements of which for the purposes of this Licence are Clause 4.5.1 as relevant to Clause 9 (Interference - Electromagnetic Compatibility), Clause 4.5.2 as relevant to Clause 11.1 (Acoustic noise and signals), and Clause 4.5.3 as relevant to Clause 11.2 (Compass safe distance).
- (f) The maximum power shall not exceed 39 dBW/40 kHz e.i.r.p. (53 dBW e.i.r.p. total per channel) from any individual ESV. The vessel may transmit a maximum of two 14.0 to 14.25 GHz channels up to a total of 56 dBW e.i.r.p. under this Licence.
- (g) Where the ESV is operating between one nautical mile and four nautical miles of United Kingdom land, the minimum elevation angle used by the ESV shall exceed 7 degrees.
- (h) Where the ESV is operating within one nautical mile of United Kingdom land, the minimum elevation angle used by the ESV shall exceed 15 degrees.
- (i) The antennas of earth stations operating with Geostationary Satellites shall meet the minimum performance specified in Recommendation ITU-R S.580-6.
- (j) For operation with Geostationary Satellites, the ESV shall employ a stabilised platform with the ability to maintain a pointing accuracy ± 0.2 degrees towards the Geostationary Satellite throughout transmissions.
- (k) The Maximum ESV e.i.r.p. spectral density toward the horizon shall be less than 12.5 dB(W/MHz).
- (l) The Maximum ESV e.i.r.p. towards the horizon shall be 16.3 dBW.
- (m) The Apparatus complies with (and is maintained in accordance with) the relevant performance specification(s).
- (n) Operation of the ESV within the territorial waters of administrations other than the UK is subject to the relevant regulations and authorisations of

those administrations.

5. In this Notice of Variation to the Licence:

- (a) "Earth Station" means a station for transmitting and receiving wireless telegraphy located on the surface of the earth and intended for communication with one or more satellites;
- (b) "Geostationary Satellite" means a satellite having the earth as its primary body and which remains approximately in a fixed position relative to the earth;
- (c) "Non-Geostationary Satellite" means a satellite that does not remain fixed relative to a position on the surface of the earth;
- (d) "IEC 60945" means the Fourth Edition published in August 2002 of the International Electrotechnical Commission Standard – "Maritime navigation and radiocommunication equipment and systems – General requirements – Methods of testing and required test results";
- (e) "R&TTE Directive" means 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;
- (f) "Recommendation ITU-R S. 580-6" means the Recommendation S. 580-6 published in January 2004 by the International Telecommunication Union;
- (g) "ITU Radio Regulations" means the 2012 edition of the ITU Radio Regulations made under Article 13 of the Constitution of the International Telecommunication Union;
- (h) all technical terms, unless the contrary intention appears, shall have the meaning assigned to them in the ITU Radio Regulations.

6 This Notice of Variation shall be attached to the Ship Radio Licence.

7 This Notice of Variation shall take immediate effect.

Issued by Ofcom:

**Ofcom Spectrum
Licensing Riverside
House
2a Southwark Bridge
Road London, SE1 9HA
UK
Tel. +44 (0)20 7981 3131
Fax. +44 (0)20 7981 3235**

**Textphone
020 7981
3043
Email spectrum.licensing@ofcom.org.uk**

Notes for Licensees

1. This Notice of Variation does not affect the requirement, where necessary, to obtain licences or authorisations under other legislation or from other countries prior to the installation or operation of an ESV, in particular outside of UK territorial waters. The Licensee is encouraged to seek its own independent professional advice in this respect.
2. For the purpose of complying with paragraph 4(c) above, the following standards are considered harmonised standards for the purposes of Article 5 of the R&TTE Directive:
 - (a) EN 301 428, published in May 2000 by the European Telecommunication Standards Institute (ETSI);
 - (b) EN 301 489-20, published in November 2002 by ETSI.
3. Further guidance and information can be obtained from:

Ofcom Spectrum Licensing
Riverside House
2a Southwark Bridge Road
London, SE1 9HA
UK
Tel. +44 (0)20 7981 3131
Fax. +44 (0)20 7981 3235
<http://www.ofcom.org.uk>

and, in respect of any survey and certification requirements:

The Maritime and Coastguard Agency
Survey and Certification
Spring Place
105 Commercial Road,
Southampton
So15 1EG.
Tel: 02380 329100
Fax: 02380 329466
<http://www.mcga.gov.uk/>

Annex 5

Ships Radio Licence Notice of Variation for ESOMPs



WIRELESS TELEGRAPHY ACT 2006

NOTICE OF VARIATION OF SHIP RADIO LICENCE FOR THE PURPOSE OF THE INSTALLATION AND USE OF SATELLITE EARTH STATION(S) ON MOBILE PLATFORMS (“ESOMPs”) ON BOARD A SHIP

Ofcom, in exercise of the power conferred by Schedule 1, paragraph 6 of the Wireless Telegraphy Act 2006 (the “WT Act”), in accordance with Schedule 1, paragraph 7 of the WT Act, hereby varies the Ship Radio Licence granted to:

[Name of Licensee]

in respect of the vessel identified below:

Vessel name	<vessel name>
Licence No.	<licence no>
Call Sign	<call sign>
MMSI No.	<MMSI no>
Date of Issue of this Notice of Variation:	<date of NoV>

- 1 Terms and expressions defined in the Licence shall have the same meaning herein except where the context requires otherwise or where otherwise stated.
- 2 The terms of the Licence shall be varied from the Date of Issue of this Notice of Variation, such that the following radio equipment may, in addition to that already set out in the Licence, be established, installed and used on the vessel named above subject to the terms set out in the Ship Radio Licence as varied by paragraphs 3 to 6 below:
 - (a) Sending and receiving Earth Station(s) on Mobile Platforms (“ESOMPs”) on board a vessel for the purpose of providing wireless telegraphy links

between the ESOMP and Satellite(s) (together the “Radio Equipment”).

- 3 The terms of the Licence shall be varied from the Date of Issue of this Notice of Variation, such that the additional terms below shall apply in respect of the establishment, installation and use of the radio equipment described in paragraph 2(a), and shall be read as an integral part of the Licence for this purpose:
- (a) The Radio Equipment shall be operated on a ‘non-interference non-protected’ basis; that is, the Radio Equipment shall not cause harmful interference to, and shall not claim protection against harmful interference originating from, any other radio communication service operating in accordance with Article 5 of the ITU Radio Regulations, wherever that service may be operating;
 - (b) Within the territorial sea of the UK, the Channel Islands¹⁶ or the Isle of Man, the licensee may operate the Radio Equipment operating with Geostationary Satellites only in the frequency bands identified below:
 - i) 27.5 – 27.8185 GHz, 28.4545 – 28.8265 GHz and 29.4625 – 30 GHz transmission (Earth-to-space)
 - ii) 17.3 – 20.2 GHz for reception (space-to-Earth)
 - (c) Within the territorial sea of the UK, the Channel Islands or the Isle of Man, the licensee may operate the Radio Equipment operating with Non-Geostationary Satellites only in the frequency bands identified below:
 - i) 27.5 – 27.8185 GHz, 28.4545 – 28.8265 GHz and 29.5 – 30 GHz for transmission (Earth-to-space)
 - ii) 17.3 – 20.2 GHz for reception (space-to-Earth)
 - (d) Outwith the territorial sea of the UK, the Channel Islands and the Isle of Man, the licensee may operate the Radio Equipment operating with Geostationary Satellites in any part of the frequency band 27.5 – 30 GHz;
 - (e) Outwith the territorial sea of the UK, the Channel Islands and the Isle of Man, the licensee may operate the Radio Equipment operating with Non-Geostationary Satellites in any part of the frequency bands 27.5 – 29.1 GHz and 29.5 – 30 GHz;
 - (f) Within the territorial sea of an administration other than the UK, the Channel Islands or the Isle of Man, the Radio Equipment shall be used in accordance with the relevant regulations and authorisations of that administration;
 - (g) Means shall be used to allow transmissions of the Radio Equipment to be identified.

¹⁶ The Bailiwick of Jersey and the Bailiwick of Guernsey

- 4 The earth stations operating with Non-Geostationary Satellites shall ensure compliance with the equivalent power flux-density limitations specified in Article 22 of the ITU Radio Regulations.
- 5 The operation of the Radio Equipment shall comply with the essential requirements of the R&TTE Directive and with the technical and operational criteria contained within the UK Interface Requirement 2093.
- 6 Interpretation for the purposes of this Notice of Variation:
 - (a) "Earth Station" means a station for transmitting and receiving wireless telegraphy intended for communication with one or more satellites;
 - (b) "Geostationary Satellite" means a satellite in geostationary orbit which remains approximately in a fixed position relative to a position on the surface of the earth;
 - (c) "Non-Geostationary Satellite" means a satellite that does not remain fixed relative to a position on the surface of the earth;
 - (d) "ITU Radio Regulations" means the 2012 edition of the ITU Radio Regulations made under Article 13 of the Constitution of the International Telecommunication Union;
 - (e) "R&TTE Directive" means Directive 1995/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and electronic communications service terminal equipment and the mutual recognition of their conformity;
 - (f) "UK Interface Requirement IR 2093" means the UK Interface Requirement 2093 – Earth Stations on Mobile Platforms (ESOMPs) published by Ofcom in accordance with Article 4.1 of the RTTE Directive;
 - (g) All technical terms, unless the contrary intention appears, shall have the meaning assigned to them in the ITU Radio Regulations.
- 7 This Notice of Variation forms part of and shall be attached to the Ship Radio Licence stated above.

Issued by Ofcom

Annex 6

Glossary

CAA	Civil Aviation Authority (https://www.caa.co.uk/home/)
CI	Channel Islands
dBW	A unit for the measurement of the strength of a signal expressed in decibels relative to one watt.
deg	Degree
e.i.r.p	Equivalent Isotropically Radiated Power
epfd	Equivalent Power Flux Density
ETSI	European Telecommunications Standards Institute
GHz	Gigahertz
ITU	International Telecommunications Union (http://www.itu.int/en/Pages/default.aspx)
kHz	Kilohertz
km	Kilometer
MHz	Megahertz
NI	Northern Ireland
pdf	Power Flux Density
R&TTE	Radio and Telecommunication Terminal Equipment
UK	United Kingdom
VSAT	Very Small Aperture Terminal
WRC	World Radio Conference ((03) denotes year of conference - 2003)