

Licensing Procedures Manual for Satellite (Permanent Earth Station) Applications

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1	PURPOSE OF MANUAL	3
2	RELEVANT LEGISLATION AND POLICY	3
	2.1 Radio Equipment Directive (Directive 2014/53/EU)	3
	2.2 Wireless Telegraphy (WT) Act 2006 – Licensing	3
	2.3 Wireless Telegraphy (WT) Act 2006 - Spectrum Pricing	3
	2.4 Broadcasting Act 1990	3
	2.5 Directive 2015/1535/EU	3
	2.6 Enforcement	4
3	EQUIPMENT REQUIREMENTS	4
	3.1 Minimum Requirements	4
	3.2 Operational Requirements	4
	3.3 National and International Obligations	5
4	TAKE-OVERS, TRANSFERS AND CHANGES OF NAME	5
5	COORDINATION AND INTERNATIONAL REGISTRATION	5
6	PLANNING AND PROTECTION	6
7	DISCLOSURE OF INFORMATION	6
8	DESCRIPTION OF LICENCE PRODUCT	6
9	LICENCE APPLICATIONS	6
	9.1 General	6
	9.2 Making your Application	6
	9.3 How to complete your application form	7
	9.3.1 New Customers	7
	9.3.2 Checking your application	7
	9.3.3 Licence Fees	7
	9.3.4 Payment Method	7
	9.3.5 Where to send your form	7
10	DISCLAIMER	7
11	CONTACT DETAILS	7
12	THE SATELLITE (PERMANENT EARTH STATION LICENCE)	9
13	DEFINITIONS	15
14	GLOSSARY	16

1 PURPOSE OF MANUAL

This is the Licensing Procedures Manual for Satellite (Permanent Earth Station) applications (PES) and complements the more general licensing policy and procedures described in the overarching Licensing Policy Manual of Ofcom.

This Manual provides information specifically relevant to the licensing of Satellite (Permanent Earth Stations). The manual will be subject to revision as necessary to align with current technological developments for reasons related to the effective and appropriate use of the spectrum.

The criteria contained in the licensing manual along with the appropriate UK Radio Licence Interface Requirements apply to the licensing of Satellite (Permanent Earth Stations) operating in the UK.

2 RELEVANT LEGISLATION AND POLICY

2.1 Radio Equipment Directive (Directive 2014/53/EU)

The Radio Equipment Directive (RED) (Directive 2014/53/EU) is European legislation which sets out regulatory compliance requirements for radiocommunications equipment in the European Union. The RED updates and replaces Directive 1999/5/EC, the Radio and Telecommunications Terminal Directive (R&TTE Directive) with effect from 13 June 2016. There are many similarities between the RED and R&TTE; equipment must conform with a set of essential requirements, and compliance with harmonised standards offers a presumption of conformity.

A transitional period applies so existing radio equipment covered by the RED but which has been tested and certified in conformity with the R&TTE Directive before 13 June 2016 may continue to be placed on the market until 12 June 2017 (i.e. up to one year after the RED comes into effect) and indeed can be put into service after that date. From 13 June 2017, however, equipment covered by the RED can only be placed on the market if it conforms with the RED.

2.2 Wireless Telegraphy (WT) Act 2006 – Licensing

Installation and use of radio equipment is authorised by a licence issued under the WT Act 2006.

2.3 Wireless Telegraphy (WT) Act 2006 - Spectrum Pricing

The WT Act 2006 provides the Ofcom with spectrum management legislation to manage the spectrum more effectively and promote its optimal utilisation. Licence fees are set out annually in regulations made under the WT Act 2006.

2.4 Broadcasting Act 1990

For satellite broadcasting, a Broadcasting Act licence may also be required.

2.5 Directive 2015/1535/EU

Directive 2015/1535/EU is intended to help avoid the creation of trade barriers within the European Community. It requires Member States to notify the Technical Regulations pertinent to a particular licence type to the European Commission to allow Member States the opportunity to comment.

All new and revised Technical Regulations are notified to the EC under the Directive notification procedures. All Technical Regulations are subject to a 3-month mandatory 'stand still period', for consultation which starts when they are received by the EC. Following the 'stand still period' and provided no objections are received from Member States then the new or amended Technical Regulation can be published and implemented.

2.6 Enforcement

Ofcom provides an enforcement service which aims to ensure that licensees operate within the conditions of their licence. On the whole, this requires us to investigate complaints of interference affecting existing licensees.

3 EQUIPMENT REQUIREMENTS

3.1 Minimum Requirements

The "essential requirements" of Article 3.2 of Directive 2014/53/EU include the minimum system requirements that are deemed necessary for reasons related to the effective and appropriate use of the radio spectrum. The information sheet OfW 241 gives a high level description of how spectrum in the UK is used for satellite systems.

3.2 Operational Requirements

Operators are required to conform to all conditions defined within the licence. Details can be found in Section 12.

Earth station antennas shall not be employed for transmission at elevation angles of less than 3 degrees measured from the horizontal plane to the direction of maximum radiation.¹

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 by Radio Regulations RR Nos. 21.8 – 21.15.

The level of off axis equivalent isotropically radiated power (e.i.r.p.) emitted by any earth station brought into service after June 2000 shall not exceed those limits specified in Radio Regulations RR 22.26-22.39 in bands where these limits are applied

The relevant satellite is either fully operational or will be fully operational in the bands applied for within 3 years of the date of application at an orbital location known to the UK administration.

In the band 13.75-14 GHz, an earth station of a geostationary fixed-satellite service network shall have a minimum antenna diameter of 1.2m and an earth station of a non-geostationary fixed-satellite service system shall have a minimum antenna diameter of 4.5m. Earth stations with an antenna diameter of less than 4.5m shall operate on a non-interference basis with respect to maritime Radiolocation stations². The e.i.r.p. of any emission from an earth station with an antenna diameter greater than 4.5m should not exceed 85 dBW.

The e.i.r.p. density of any emissions from an earth station in the bands 13.77-13.78 GHz shall comply with RR 5.503.

The power flux density produced by an earth station, licensed directly by Ofcom and operating in the bands 27.8185-28.4545 GHz and 28.8265-29.4625 GHz, shall not

¹ ITU-RR 21.14

² ITU-RR 5.502

exceed $-108.5 \text{ dB(W/(m}^2 \cdot \text{MHz))}$ for more than 50% of the time produced at 6m above ground level at a distance of 6 kms from the earth station.

A Permanent Earth Station can only operate from the one known, fixed, terrestrial UK location that has been specified in the application or previously supplied to Ofcom.

The Apparatus used for transmission complies with the Radio Equipment Directive and all appropriate National Interface Requirements for Satellite Earth Stations in force within the UK.

The Antenna Radiation Pattern Envelope meets the minimum performance specified by ITU Recommendation ITU-R S.465, or ITU-R.S.580 for antennas installed after 1995.

All transmissions comply with the individual schedules contained within that Licence. Where appropriate, Ofcom may require that the Licensee provide additional screening at the installation as a condition of licence.

3.3 National and International Obligations

The earth station must obtain satisfactory site clearance and coordination for operation at the specified location prior to commencing operation in the UK.

The relevant satellite data shall have been submitted to the ITU in accordance with established ITU procedures.

All transmissions to the satellite must be authorised by the Satellite Operator and the apparatus must comply with their published technical requirements and the UK Frequency Allocation Tables.

All transmissions in Satellite Services other than the Mobile Satellite Service must be terminated prior to any change of location; unless operating under a specific exemption authorised by Ofcom.

The licensee agrees to participate fully in any subsequent UK coordination and site clearance procedures.

4 TAKE-OVERS, TRANSFERS AND CHANGES OF NAME

Details of the legal provisions surrounding changes to a licensee's circumstances are set out in the overarching Ofcom Licensing Policy Manual. However, Permanent Earth Station licences are tradable and as such it is possible to transfer coordination rights in certain circumstances. Decisions relating to such requests are made on a case-by-case basis.

5 COORDINATION AND INTERNATIONAL REGISTRATION

After successful completion of national coordination in respect of other radiocommunication services the Earth station is then licensed as per ITU-RR No. 4.4. International coordination may then be initiated, if required, using the method as defined in the ITU Radio Regulations Appendix 7. Applicants are advised that once an earth station Licence has lapsed the operator may lose any rights previously obtained in respect of coordination.

Permanent Earth Stations operating with a transmission Licence may also apply to Ofcom for international coordination³ in respect of their Receiver characteristics.

³ RR Articles 9 and 11

6 PLANNING AND PROTECTION

All Earth Station Licences are issued only after successful national coordination has been achieved. Ofcom does not provide frequency assignments for satellite earth stations and therefore, at this time, provides no enforcement service for the protection of services from interference due to assignments to other satellite networks. However, if international clearance has been sought and granted, the assignment becomes internationally recognised

Licensees must ensure that their apparatus (i.e. equipment with antennas) meet current planning requirements, and where the antennas may constitute a hazard, particularly to aircraft, then it is the applicant's responsibility to obtain appropriate approvals.

7 DISCLOSURE OF INFORMATION

Since PES licences are tradable, information relating to the licensee, operational characteristics and geographical position of the station will be published in the Ofcom Wireless Telegraphy Register.

8 DESCRIPTION OF LICENCE PRODUCT

The satellite service frequency bands permits space radio communication services and links to geostationary and non-geostationary satellite networks. This manual applies to the licensing of Satellite Permanent Earth Stations operating in the UK in frequency bands designated for the Satellite Services other than the Mobile Satellite Service and assigned for Earth-to-Space transmission.

A Permanent Earth Station can only operate from the one known, fixed, terrestrial UK location that has been specified in the application or previously supplied to Ofcom. Satellite Service Frequency bands that are licensed for transmission in the UK are described in Ofcom Information sheet OfW 241.

9 LICENCE APPLICATIONS

9.1 General

Applicants wishing to plan new earth station installations are advised to contact Ofcom. The licensee must appoint an individual officer to be responsible for the correct operation, supervision and maintenance of that earth station, and supply details to Ofcom.

9.2 Making your Application

Before making a licence application, you should remember that no matter who applies on your behalf, you are still legally responsible for all actions carried out on your proposed radio system. Any false information may lead to the granting of the licence being refused or revoked. Also, the licence application form does carry legal status from an evidential point of view and applicants are therefore asked to sign the declaration.

Form OfW 102 should be used for PES applications in geographical areas and frequency bands managed by Ofcom. You can obtain a copy of the OfW 102 application form from the Ofcom website, www.ofcom.org.uk. The technical characteristics of each earth station to satellite 'path' must be provided in a separate spreadsheet that can be obtained from Ofcom.

9.3 How to complete your application form

It is essential that all questions are answered as fully as possible. Incomplete forms will be returned to the applicant. You should consider each question mandatory unless otherwise stated.

9.3.1 New Customers

If you are a new customer, it is particularly important that you include all contact details on your application form, so that Ofcom can set up a new customer account.

9.3.2 Checking your application

Please ensure that you fill the licence application legibly, completely and accurately. Any missing information may result in a delay to the process or the form being returned. Information subsequently found to be inaccurate may render any licence invalid.

9.3.3 Licence Fees

Fees for Satellite (Permanent Earth Station) licences are calculated according to the spectrum and bandwidth being accessed, and the power supplied to the antenna. Details are provided in the relevant Statutory Instrument (S.I.) on Wireless Telegraphy (Licence Charges) Regulations, available from the Office of Public Sector Information website at www.opsi.gov.uk. Under this Licensing arrangement, earth stations that are closely located can benefit from a reduction in fees as a result of the reduction in total coordination area. For each site (the area contained within a circle of radius of 500m centred on a point defined by the licensee), the appropriate sum is calculated in accordance with the algorithm detailed in the S.I.

9.3.4 Payment Method

New customers will be billed on issue of the licence. Amendments will be billed on renewal of the amended licence. Payments should be made payable to the "Ofcom". Permitted methods of payment are described in the Ofcom generic Licensing Policy Manual.

9.3.5 Where to send your form

Please email form OfW102 and any accompanying technical spreadsheets to Ofcom's Spectrum Licensing Team:

Spectrum.Licensing@ofcom.org.uk

10 DISCLAIMER

Revisions to this document will occur periodically or when there is a substantive need to update the document. This document can therefore only be fully accurate at the time of writing and Ofcom apologises for any inaccuracies that may occur between major revisions. Please contact the Ofcom Licensing Centre directly if you have any queries or concerns.

If Ofcom are prevented from issuing appropriate documents to an applicant, for example as a result of an internal system failure, a temporary alternative may be provided.

11 CONTACT DETAILS

For information regarding the Satellite (Permanent Earth Station) licence, please contact:

Ofcom Spectrum
Licensing

PO Box 1285

Warrington. WA1 9GL

Email: Spectrum.Licensing@ofcom.org.uk

Telephone: 020 7981 3131

12 THE SATELLITE (PERMANENT EARTH STATION LICENCE)

Wireless Telegraphy Act 2006

SATELLITE (PERMANENT EARTH STATION)

Sector/class/product	<Product>
Licence number	<Lic_No>
Licensee	<Lic_Name>
Licensee address	<Address>
Trading as	<Tradename>
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 (PERMANENT 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 <Issue_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 Geostationary Satellite.

2. Limitations on use.

The Stations 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(s) ("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 Geostationary 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 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;
- e) in the band 13.75 – 14 GHz, earth stations with an antenna diameter of less than 4.5 m 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 RR 5.503;
- f) in the bands 27.8185 – 28.4545 GHz and 28.8265 – 29.4625 GHz, the power flux density produced by the earth station does not exceed -108.5db(W/(m² . 1MHz) for more than 50% of the time produced at 6m above ground level at a distance of 6 km from the earth station;
- g) the apparatus used for transmission complies with the Radio Equipment Directive (Directive 2014/53/EU) and all appropriate National Interface Requirements (IR) for Satellite Earth Stations in force within the UK; and
- h) the Antenna Radiation Pattern Envelope meets the minimum performance specified by ITU Recommendation ITU-R S.465, or ITU-R S.580 for antennas installed after 1995.

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.
- f) <<<Some or all of the operations listed in Schedule 2 are subject to International Co-ordination in accordance with Article 9 of the Radio Regulations. While international coordination is being carried out by Ofcom, these operations are subject to the provisions of Article 4.4 of the Radio Regulations (non-interference, non protected basis with respect to other users of this spectrum). Where international coordination is not successful, the relevant operations will be removed from the licence.>>>

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) "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) "Uplink" and any cognate expression refers to a transmission in the Earth-to-space direction
- d) "IR" means the United Kingdom Radio Interface Requirement published by Ofcom in accordance with Article 8 of the Radio Equipment Directive (Directive 2014/53/EU of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to the making available of radio equipment on the market (known as the Radio Equipment Directive)).

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
FAO Spectrum Licensing
PO Box 1285
Warrington
WA1 9GL

Email: Spectrum.Licensing@ofcom.org.uk

Website: www.ofcom.org.uk/manage-your-licence

Phone: 020 7982 3131

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 Radio Regulations.

SCHEDULE 2

Licence No	<Lic_No>	Licence version date	<Date>	Payment interval	<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>

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

Satellite Name	Orbit Long (deg)	ES Azimuth (deg)	ES Elevation (deg)
<sat name>	<orbit long>	<es azimuth>	<es elevation>

Transmit Frequency	Receive Frequency	Associated Authorised Bandwidth (MHz)	Associated Emissions
<tx-1>		<bandwidth>	A
<tx-2>		<bandwidth>	B
	<rx-1>	<bandwidth>	C
	<rx-2>	<bandwidth>	D

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

13 DEFINITIONS

Fixed Service: A radiocommunication service between specified fixed points

Fixed Satellite Service: A radiocommunication service between earth stations at given positions, when one or more satellites are used; the given position may be a specified fixed point or any fixed point within specified areas; in some cases this service includes satellite – to-satellite links, which may also be operated in the inter-satellite service; the fixed-satellite service may also include feeder links for other space radiocommunication service

Earth station:

The ITU definition of an earth station applies:

A station located either on the Earth's surface or within the major portion of the earth's atmosphere and intended for communication with one or more space stations; or with one or more stations of the same kind by means of one or more reflecting satellites or other objects in space.

ITU Regulations require that receiving stations should use equipment with technical characteristics appropriate for the class of emission concerned; in particular, selectivity should be appropriate having regard to RR **No. 3.9** on the bandwidth of emissions.

Earth Station Licences for operation in the Fixed Satellite Service bands typically provide for radio transmissions (uplinks) to specific orbital satellite positions, using transponders or spot frequencies that have been independently assigned by satellite operators.

Permanent Earth Station:

For the purposes of Licensing by the UK administration, a Permanent Earth Station is defined as being an earth station which:

- provides a space radiocommunication service operating in the Fixed Satellite Service, or as feeder links to satellites operating in broadcast satellite service, or mobile satellite service, or aeronautical mobile services
- is provided with UK frequency assignment(s) by a satellite operator to operate a satellite link or multi-satellite link to geostationary satellite networks that have been notified to the ITU.

Satellite Network:

A Satellite Network is defined as

a satellite system or a part of a satellite system consisting of only one satellite and the cooperating earth stations

14 GLOSSARY

AP7	Appendix 7 of ITU-RR: Method for the Determination of the coordination area around an earth station in frequency bands between 1GHz and 40GHz shared between space and terrestrial radiocommunication services
CEPT	European Conference of Postal and Telecommunications Administrations
dBW	Power expressed logarithmically in Decibels relative to 1 Watt
EIRP	Equivalent Isotropically Radiated Power
EN	Euronorm
ERC	European Radio Committee
ETSI	European Telecommunications Standardisation Institute
ITU	International Telecommunication Union
ITU-R	ITU Radiocommunication sector
ITU-RR	ITU Radio Regulations
Ofcom	Office of Communications
UK	United Kingdom
WT	Wireless Telegraphy