

Wireless Telegraphy Act 2006

Satellite (temporary E band non-geostationary earth station)

Sector/class/product	<product></product>
Licence number	<lic_no></lic_no>
Licensee	<lic_name></lic_name>
Licensee address	<address></address>
Licence first issue date	<lssue_date></lssue_date>
Licence version date	<date></date>
Payment interval	<year></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.

1. Licence term

1.1. This Licence shall continue in force until 31 December 2028 unless earlier revoked by Ofcom or surrendered by the Licensee.

2. Licence variation and revocation

- 2.1. Pursuant to schedule 1 paragraph 8 of the Wireless Telegraphy Act 2006 ("the Act"), Ofcom may not revoke this Licence under schedule 1 paragraph 6 of the Act except:
 - a) at the request of, or with the consent of, the Licensee;
 - b) if there has been a breach of any of the conditions of this Licence;
 - c) in accordance with schedule 1, paragraph 8(5) of the Act;
 - d) if it appears to Ofcom to be necessary or expedient to revoke the Licence for the purposes of complying with a direction by the Secretary of State given to Ofcom under section 5 of the Act or section 5 of the Communications Act 2003;
 - e) for reasons related to the management of the radio spectrum, provided that in such case the power to revoke may only be exercised after at least one (1) month's notice is given in writing to the Licensee.



2.2. Where Ofcom exercise their power to revoke or vary the Licence in accordance with schedule 1 paragraph 6 of the Act, the Licensee shall be notified in writing or by a general notice. Any general notices will be posted on the Ofcom website.¹

3. Transfer

3.1. This Licence may not be transferred.

4. Changes to licensee details

4.1. The Licensee must give immediate notice to Ofcom in writing of any change to the Licensee's name and address from that recorded on the Licence.

5. Fees

- 5.1. The Licensee shall pay to Ofcom the relevant fee(s) as provided in section 12 of the Act and the regulations made thereunder:
 - a) on or before the date of issue of the Licence; or
 - b) on or before such other date or dates as shall be notified in writing to the Licensee, in accordance with those regulations and any relevant terms, provisions and limitations of the Licence.

6. Radio Equipment Use

- 6.1. The Licensee must ensure that the Radio Equipment is constructed, established, installed and used only in accordance with the provisions specified in the schedules to this Licence. Any proposal to amend any detail specified in any of the schedules to this Licence must be agreed with Ofcom in advance and implemented only after this Licence has been varied or reissued accordingly.
- 6.2. The Licensee must ensure that the Radio Equipment is used only by persons who have been authorised by the Licensee to do so, and that such persons are made aware of, and of the requirement to comply with, the terms of this Licence.
- 6.3. The Licensee shall ensure that the establishment, installation, modification or use of the Radio Equipment is carried out in accordance with the provisions set out in Schedule 3 (EMF Licence Condition) to this Licence in relation to electromagnetic field (EMF) exposure.

7. Access and Inspection

7.1. The Licensee shall permit any person authorised by Ofcom:

¹ www.ofcom.org.uk



- a) to have access to the Radio Equipment; and
- b) to inspect this Licence and to inspect the Radio Equipment,

at any and all reasonable times or, when in the opinion of that person an urgent situation exists, at any time, to ensure the Radio Equipment is being used in accordance with the terms of this Licence.

8. Modification, Restriction and Closedown

- 8.1. A person authorised by Ofcom may require the Radio Equipment or any part thereof, to be modified or restricted in use, or temporarily or permanently closed down immediately if in the opinion of the person authorised by Ofcom:
 - a) a breach of a term of this Licence has occurred; and/or
 - b) the use of the Radio Equipment is, or may be, causing or contributing to undue interference to the authorised use of other radio equipment.
- 8.2. Ofcom may require any of the Radio Equipment to be modified or restricted in use, or temporarily closed down either immediately or on the expiry of such period as may be specified in the event of a national or local state of emergency being declared. Ofcom may only exercise this power after a written notice has been served on the Licensee or a general notice applicable to holders of a named class of licence has been published.

9. Interpretation

9.1. In this Licence:

the establishment, installation and use of the Radio Equipment shall be interpreted as establishment and use of stations and installation and use of apparatus for wireless telegraphy as specified in section 8 of the Act;

the expression "undue interference" shall have the meaning given by Section 115 of the Act;

"inspect" includes examine and test;

"Radio Equipment" means the radio equipment specified in this Licence;

"wireless telegraphy apparatus" has the meaning given to it in section 117 of the Wireless Telegraphy Act 2006;

"wireless telegraphy station" has the meaning given to it in section 117 of the Wireless Telegraphy Act 2006;

any schedule to this Licence shall form part of this Licence together with any subsequent schedule which Ofcom may issue as a variation to this Licence; and



the Interpretation Act 1978 shall apply to this Licence as it applies to an Act of Parliament.

ISSUED BY OFCOM



Satellite (temporary E band 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 **<Issue_Date>**, and describes the terms and equipment specifications covered by this Licence.

1. The Licensee may establish and use:

1.1. 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

- 2.1. 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; and
 - f) the station shall be operated only from the location specified on the schedule.

3. Apparatus

- 3.1. The Licensee shall ensure that:
 - a) the wireless telegraphy 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 satellite;
 - c) the apparatus used for transmission complies with the Radio Equipment Regulations 2017 and all appropriate National Interface Requirements (IR) for satellite earth stations in force within the UK; and



- d) the antenna radiation pattern envelope meets the minimum performance specified by the operator of the satellite.
- 3.2. 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;
- 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; and
- 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. Additional conditions

- 5.1. The radio frequencies authorised by this Licence must be used in common with other non-geostationary satellite systems authorised under wireless telegraphy licences granted by Ofcom. The names of these licensees shall be notified by Ofcom to the Licensee from time to time, and together with the Licensee are described as the "NGSO Licensees".
- 5.2. The radio frequencies authorised by this Licence must only be used to communicate with a satellite system which has transmissions authorised under a Satellite (Earth Station Network) wireless telegraphy licence granted by Ofcom.
- 5.3. In the event that
 - a) one (or more than one) of the NGSO Licensees suffers a material and recurring (or ongoing) degradation of services to its users at a specific region or location in the United Kingdom; and
 - b) the degradation of services is resulting from radio transmissions from the earth stations operated by the Licensee;



Ofcom may by notice instruct the Licensee to cease or change the use of particular equipment or particular radio frequencies which are authorised under this Licence.

- 5.4. Any such cessation or change must be for the purposes of ensuring that such interference is avoided and the degradation of services to users at the particular regions or locations is resolved.
- 5.5. Following receipt of such notice, for such period of time as may be specified in the notice, the Licensee may only operate in accordance with the terms and conditions of the notice.
- 5.6. The Licensee must establish, install and use the radio equipment to commence regular wireless telegraphy transmissions in accordance with the provisions of this Licence within three months of the date that this Licence is issued, and maintain such transmissions thereafter.

6. Conditions for the protection of other services

- 6.1. Grant of this temporary licence is on the condition that the licensee shall not cause harmful interference to fixed links in the 71-76 GHz band and EESS (passive) in the adjacent 86 92 GHz band.
- 6.2. In the event of any reported harmful interference to fixed links in the 71 76 GHz and EESS (passive) in the adjacent 86 92 GHz band, the licensee shall cooperate and take all necessary steps to resolve harmful interference cases including immediately ceasing transmissions as necessary.
- 6.3. Ofcom may modify the technical conditions in this licence, if necessary, to prevent harmful interference to other users in the same or adjacent bands or to facilitate coexistence with additional satellite systems that may apply to use the spectrum during the period of the licence.
- 6.4. For the bands 71-76 GHz and 81 86 GHz, the licensee shall keep record of number of operational gateway sites within any 2,000,000 km² area that contains one or more of the gateway sites in the UK and number of operational satellites in their constellation and provide this information to Ofcom, when requested.
- 6.5. The licensee shall comply with all the applicable international regulations and obligations, including ITU Radio Regulation Articles 21 and 22 (including No. 22.2).
- 6.6. The maximum transmitter power density at the antenna port of gateway earth station shall be limited to -20.8 dBW/1MHz.
- 6.7. The Antenna Radiation Pattern Envelope shall meet the minimum performance specified by Recommendation ITU-R S.580.
- 6.8. The minimum elevation angle of 25 degrees with respect to the local horizontal plane shall apply for all gateway beams.



6.9. The licensee shall ensure that power flux-density (pfd) at the Earth's surface produced by emissions from a space station in the 71 – 76 GHz band, including emissions from a reflecting satellite, for all conditions and for all methods of modulation, shall not exceed the limit given in Table 1. The limit relates to the power flux-density which would be obtained under assumed free-space propagation conditions.

Table 1: Power flux density limits for NGSO space station in the 71 - 76 GHz

Reference Bandwidth 1 MHz					
Angle of arrival, δ, above the horizontal plane (°)	0-5	5-15	15-25	25-90	
PFD limit in dB(W/m ²)	-120	-120+(δ-5)	-110+0.5(δ-15)	-105	

- 6.10. For the protection of EESS operations in the 86-92 GHz band, the received unwanted emission power from all adjacent-band interference sources, including licensee's gateways, shall be limited to –169 dBW per 100 MHz within the 86-92 GHz passive band, as described in Recommendation ITU-R RS.2017-0.
- 6.11. The unwanted emission power level per gateway uplink beam, as measured at the antenna port, shall not exceed:
 - i) -41.2 16.3(f 86) dBW/100 MHz for $86.05 \le f \le 87 \text{ GHz}$
 - ii) -57.5 dBW/100 MHz for $87 < f \le 91.95 \text{ GHz}$

where f is the centre frequency of the 100 MHz reference bandwidth expressed in GHz.

- 6.12. The licensee shall ensure that the unwanted emission limits provided in 6.10 and 6.11 are met during all gateway transmissions.
- 6.13. The licensee shall ensure that gateway uplink operations in the 81 86 GHz band must comply with the following conditions:
 - Maximum of 76 total simultaneously transmitting gateway sites within any square on the Earth that covers two million km2 that includes one or more of the licenced gateway sites in the UK
 - ii) Maximum of 32 total simultaneously transmitting uplink beams per operational gateway site.

7. Interpretation

7.1. In this and subsequent schedule(s):

"earth station" means a radio transmitter located on the surface of the earth and intended for communication with one or more satellites;



"non-geostationary satellite" means a satellite that does not remain fixed relative to a position on the surface of the earth; and

"uplink" and any cognate expression refers to a transmission in the earth-tospace direction

Notes

- 1. This Licence does not remove any other obligations that the Licensee may have in relation to satellite filings made under the ITU Radio Regulations.
- 2. 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.
- 3. Advice can be sought from Ofcom using the contact details on page 1 of this Licence and the appropriate Local Authority planning department.
- 4. The Licensee must apply for a variation of the Licence from Ofcom before making any changes which may contravene the Licence.
- 5. Technical terms used in clause 2 shall have the meanings assigned to them in the ITU Radio Regulations.



SCHEDULE 2

Licence No	<lic no=""></lic>		Licence version date	<date></date>	Payment Interval	<1 Year>
Licensing Centre P	oint	<lcp n<="" th=""><th>IGR></th><th></th><th></th><th></th></lcp>	IGR>			

Earth Station Deployment	Earth Station Name	Earth Station NGR
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			Transmit		Receive		
Antenna Centre Height AGL (m)	Antenna Type	Dish Size (m)	Tx Gain (dBi)	Tx Beamwidth (deg)	Rx Gain (dBi)	Rx Beamwidth (deg)	System Noise temperature (K)
<antenna height<br="">AGL></antenna>	<antenna type></antenna 	<dish size=""></dish>	<tx gain=""></tx>	<tx beamwidth=""></tx>	<rx gain=""></rx>	<rx beamwidth=""></rx>	<syst noise="" temp=""></syst>

Satellite Name	ES Azimuth from (deg)	ES Azimuth to (deg)	ES minimum Elevation (deg)	ES maximum Elevation (deg)
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Transmit Frequency	Receive Frequency	Associated Authorised Bandwidth (MHz)	Associated Emissions
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<tx-2></tx-2>		<bandwidth></bandwidth>	
	<rx-1></rx-1>	<bandwidth></bandwidth>	<c></c>



	<rx-2></rx-2>	<bandwidth></bandwidth>	<d></d>
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Emission reference code	Emission Type	Emission Code	Polarisation	Antenna I/P Power (dBW)	Spectral Power Density (dBW/MHz)
A	<em type="">	<em code="">	<pol></pol>	<antenna ip="" power=""></antenna>	<spectral dens="" power=""></spectral>
В	<em type="">	<em code="">	<pol></pol>	<antenna ip="" power=""></antenna>	<spectral dens="" power=""></spectral>
С	<em type="">	<em code="">	<pol></pol>	<antenna ip="" power=""></antenna>	<spectral dens="" power=""></spectral>
D	<em type="">	<em code="">	<pol></pol>	<antenna ip="" power=""></antenna>	<spectral dens="" power=""></spectral>



SCHEDULE 3

EMF LICENCE CONDITION

Sites which are not shared with another licensee

1. The Licensee shall only establish, install, modify or use Relevant Radio Equipment if the total electromagnetic field exposure levels produced by the Licensee's On-Site Radio Equipment do not exceed the basic restrictions² in the relevant tables for general public exposure identified in the ICNIRP Guidelines³ in any area where a member of the general public is or can be expected to be present when transmissions are taking place.

Sites which are shared with another licensee

- 2. In the case of a shared site where the Shared Site Exemption applies to the Licensee, the Licensee shall comply with paragraph 1 above.
- 3. In the case of a shared site where the Shared Site Exemption does not apply to the Licensee, the Licensee shall only establish, install, modify or use the Relevant Radio Equipment if:
 - i) the total electromagnetic field exposure levels produced by the Licensee's On-Site Radio Equipment, together with
 - the total electromagnetic field exposure levels produced by all other wireless telegraphy stations and wireless telegraphy apparatus operated by another licensee on the same site for which the Licensee can reasonably assume that a Shared Site Exemption does not apply,

do not exceed the basic restrictions⁴ in the relevant tables for general public exposure identified in the ICNIRP Guidelines⁵ in any area where a member of the general public is or can be expected to be present when transmissions are taking place.

Emergency Situations

4. The obligations in paragraphs 1, 2 and 3 above will not apply if the Relevant Radio Equipment is being used for the purpose of seeking emergency assistance or reporting and responding to

² Compliance with the reference levels for general public exposure identified in the ICNIRP Guidelines will ensure compliance with the basic restrictions.

³ The relevant tables for general public exposure are identified in Ofcom's "Guidance on EMF Compliance and Enforcement".

⁴ Compliance with the reference levels for general public exposure identified in the ICNIRP Guidelines will ensure compliance with the basic restrictions.

⁵ The relevant tables for general public exposure are identified in Ofcom's "Guidance on EMF Compliance and Enforcement".



an emergency situation (in the vicinity of that situation) including for search and rescue activities and maritime emergency communications.⁶

Relationship with authorised transmission levels

5. The Licensee shall comply with paragraphs 1, 2 and 3 above notwithstanding the maximum transmission levels authorised in the Licence.

Records

6. The Licensee shall keep, or shall procure that a third party shall keep, and shall make available to Ofcom on request, records (including the type of records identified in Ofcom's "Guidance on EMF Compliance and Enforcement") that demonstrate how it has complied with paragraphs 1, 2 and 3 above when Relevant Radio Equipment is established, installed, modified or used.

Ofcom's "Guidance on EMF Compliance and Enforcement"

7. When evaluating its compliance with paragraphs 1, 2 and 3 above, the Licensee shall take into account Ofcom's "Guidance on EMF Compliance and Enforcement" that is in force at the relevant time.

Interpretation

8. In this schedule:

"dBi" means the ratio in dB (decibel) when comparing the gain of the antenna to the gain of an isotropic antenna. An isotropic antenna is a theoretical antenna which radiates power uniformly in all directions;

"EIRP" means equivalent isotropically radiated power which is the product of the power supplied to an antenna and the absolute or isotropic antenna gain in a given direction relative to an isotropic antenna;

"ERP" means effective radiated power which is the product of the power supplied to an antenna and its gain in a given direction relative to a half-wave dipole;

"general public" means any person who is not: (a) the Licensee, owner, operator or installer of the Relevant Radio Equipment; or (b) acting under a contract of employment

⁶ Further information on emergency situations in set out in Ofcom's "Guidance on EMF Compliance and Enforcement".



or otherwise acting for purposes connected with their trade, business or profession or the performance by them of a public function;⁷

"ICNIRP Guidelines" means the version of the Guidelines published by the International Commission on Non-Ionizing Radiation Protection for limiting exposure to electromagnetic fields which are identified in Ofcom's "Guidance on EMF Compliance and Enforcement" that is in force at the relevant time;⁸

"Licensee's On-Site Radio Equipment" means the Relevant Radio Equipment and any other wireless telegraphy station(s) and wireless telegraphy apparatus on the same site which transmits at powers higher than 10 Watts EIRP or 6.1 Watts ERP;⁹

"Relevant Radio Equipment" means all the Radio Equipment that is authorised by this Licence to transmit at powers higher than 10 Watts EIRP or 6.1 Watts ERP;

"Shared Site Exemption" means any of the following three situations apply on a shared site in relation to the Licensee's or another licensee's wireless telegraphy station(s) or wireless telegraphy apparatus that is authorised to transmit at powers higher than 10 Watts EIRP or 6.1 Watts ERP:

• The first situation is that all of the licensee's wireless telegraphy station(s) or wireless telegraphy apparatus on a shared site do not transmit at a combined total radiated power in any particular direction¹⁰ that is higher than 100 Watts EIRP or 61 Watts ERP.¹¹

https://www.icnirp.org/cms/upload/publications/ICNIRPemfgdl.pdf ("1998 Guidelines") or the ICNIRP Guidelines for limiting exposure to electromagnetic fields (100 KHz to 300 GHz), published in: Health Physics 118(5): 483–524; 2020 and available at: https://www.icnirp.org/cms/upload/publications/ICNIRPrfgdl2020.pdf ("2020 Guidelines"). However, once work on the relevant standards explaining the methodology for assessing compliance with the 2020 Guidelines has progressed sufficiently, Ofcom will publish a public consultation on updating its "Guidance on EMF Compliance and Enforcement" to explain that going forward Ofcom will be requiring the Licensee to comply with the 2020 Guidelines only. Following this public consultation, Ofcom will publish an updated version of Ofcom's "Guidance on EMF Compliance and Enforcement" on its website. Ofcom will follow the same process for any subsequent versions of the ICNIRP Guidelines.

⁷ There is pre-existing health and safety legislation which already requires employers to protect workers from exposure to electromagnetic fields ("EMF") including the following legislation specifically relating to EMF (as amended from time to time): <u>The Control of Electromagnetic Fields at Work Regulations 2016</u>, <u>The Control of Electromagnetic Fields at Work Regulations and Fishing Vessels (Health and Safety at Work) (Electromagnetic Fields) Regulations 2016</u>.

⁸ Ofcom's "Guidance on EMF Compliance and Enforcement" will initially require the Licensee to comply with the ICNIRP Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz), published in: Health Physics 74(4):494-522, dated April 1998 and available at:

⁹ 10 Watts EIRP is equivalent to 6.1 Watts ERP. In linear units EIRP (W) = 1.64 x ERP (W); in decibels EIRP (dB) = ERP (dB) + 2.15. Ofcom's "Guidance on EMF Compliance and Enforcement" explains how the Licensee can determine if wireless telegraphy station(s) or wireless telegraphy apparatus "transmits at powers higher than 10 Watts EIRP or 6.1 Watts ERP".

¹⁰ For the purpose of this situation, the combined total radiated power is a simple sum of the radiated powers (in EIRP or ERP) of all of the licensee's wireless telegraphy station(s) or wireless telegraphy apparatus on the shared site that transmits signals covering the same or overlapping areas.

¹¹ 100 Watts EIRP is equivalent to 61 Watts ERP.



- The second situation is that the total electromagnetic field exposure levels produced by the licensee's wireless telegraphy station(s) or wireless telegraphy apparatus in any area where a member of the general public is or can be expected to be present when transmissions are taking place is no more than 5% of the basic restrictions or 5% of the reference levels in the relevant tables for general public exposure identified in the ICNIRP Guidelines.¹²
- The third situation is where the licensee's wireless telegraphy station or wireless telegraphy apparatus has an antenna gain that is equal to or higher than 29 dBi and has a fixed beam.

"shared site" means a site that is shared by the Licensee and at least one other licensee for the purposes of establishing, installing, modifying or using wireless telegraphy stations or wireless telegraphy apparatus;

"site" means a physical structure, building, vehicle or moving platform.

Ofcom

¹² The relevant tables for general public exposure are identified in Ofcom's "Guidance on EMF Compliance and Enforcement".