Aircraft radio licence – authorisation of special channels and radio equipment

2 GHz CGC - SATELLITE-FACING TERMINALS AND COMPLEMENTARY GROUND COMPONENT-FACING TERMINALS FORMING PART OF A 2 GHz MOBILE SATELLITE SERVICE

A1. Where the equipment listed in Clause 2 of the Licence includes Satellite-facing terminals and Complementary Ground Component (CGC)-facing terminals ("the 2 GHz CGC Equipment"), the following terms and conditions shall apply.

(a) The 2 GHz CGC Equipment shall be operated on a 'non-interference non-protected' basis: that is, the use of the 2 GHz CGC Equipment shall not cause harmful interference to and shall not claim protection against harmful interference from any other radio communication service operating in accordance with Article 5 of the Radio Regulations, wherever that other service may be operating;

(b) When the aircraft is on the ground and stationary the 2 GHz CGC Equipment may transmit at the limits set out in Clauses A2(a)(ii) and 2(b)(ii), below, provided the duration is restricted to the time necessary to test the 2 GHz CGC Equipment on board the aircraft;

(c) The Licensee must operate the 2 GHz CGC Equipment only within the frequency bands identified below:

Satellite segment		**CGC segment**	
Aircraft-to-satellite	**Satellite-to-aircraft**	**Aircraft-to-CGC**	**CGC-to-aircraft**
1980-1995 MHz	2170-2185 MHz	1980-1995 MHz	2170-2185 MHz

(d) The Licensee is authorised to install and use the 2 GHz CGC Equipment in or over:

(i) The UK, the UK's territorial seas, the Channel Islands[1] or the Isle of Man; and

(ii) Any Member State of the European Union as defined in the Interpretation Act 1978.

(e) When the aircraft is in or over an administration other than the UK, the Channel Islands or the Isle of Man, the 2 GHz CGC Equipment shall be used in accordance with the relevant regulations and authorisations of that administration;

(f) Identification signals or other means shall be used to allow transmissions of the 2 GHz CGC Equipment to be identified;

(g) The Licensee is only authorised to operate the 2 GHz CGC Equipment to connect with a satellite or CGCs operated by Inmarsat Ventures Limited forming part of a 2GHz Mobile Satellite System.

A2. The 2 GHz CGC Equipment shall comply with the essential requirements of the Radio Equipment Directive (2014/53/EU) and with the following maximum transmit power / power density conditions, when transmitting within the 1980 to 1995 MHz band:

(a) when transmitting to a satellite:
  (i) 45 dBm / 200 kHz e.i.r.p. is permitted when the aircraft is operating at altitudes of 1000 metres and above;
  (ii) 24 dBm / 200 kHz e.i.r.p. is permitted when the aircraft is operating at an altitude below 1000 metres;

(b) when transmitting to one or more CGCs:
  (i) 40 dBm e.i.r.p is permitted when the aircraft is operating at altitudes of 1000 metres and above; or
  (ii) 24 dBm e.i.r.p. is permitted when the aircraft is operating at altitudes below 1000 metres.

Interpretation

(a) All technical terms, unless the contrary intention appears, shall have the meaning assigned to them in the Radio Regulations;

(b) "associated facilities" and "electronic communications network" have the meaning given to them by section 32 of the Communications Act 2003(b);

(c) "CGCs" of mobile satellite systems (MSS) shall mean ground-based stations used at fixed locations, in order to improve the availability of MSS in geographical areas within the footprint of the system's satellite(s), where communications with one or more space stations cannot be ensured with the required quality;[2]

(d) "CGC-facing terminal" means a mobile earth station installed on an aircraft which communicates with one or more CGCs forming part of a Mobile Satellite System;

[1] The Bailiwick of Jersey and the Bailiwick of Guernsey

[2] This is the definition used in Article 2 of Decision No 626/2008/EC of the European Parliament and of the Council of 30 June 2008 on the selection and authorisation of systems providing mobile satellite services (MSS).

(e) "dBm" means decibels of power referenced to one milliwatt;

(f) "e.i.r.p." means equivalent isotropic radiated power;

(g) "EU Decisions" means:

(i) Decision No 626/2008/EC of the European Parliament and of the Council of 30 June 2008 on the selection and authorisation of systems providing mobile satellite services (MSS); and

(ii) Commission Decision 2009/449/EC of 13 May 2009 on the selection of operators of pan-European systems providing mobile satellite services (MSS);

(h) "Inmarsat Ventures limited" means Inmarsat Ventures Limited, a company incorporated in England and Wales with number 03674573, whose registered office is situated at 99 City Road, London, EC1Y 1AX;

(i) "kHz" means kilohertz;

(j) "Mobile Satellite Systems" shall mean electronic communications networks and associated facilities capable of providing radio-communications services between a mobile earth station and one or more space stations, or between mobile earth stations by means of one or more space stations, or between a mobile earth station and one or more complementary ground components used at fixed locations. Such a system shall include at least one space station;[3]

(k) "MHz" means megahertz;

(l) "Radio Regulations" means the 2015 edition of the Radio Regulations made under Article 13 of the Constitution of the International Telecommunication Union;

(m) "Radio Equipment Directive" means Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC;

(n) "Satellite-facing terminal" means a mobile earth station installed on an aircraft which communicates with one or more satellites forming part of a Mobile Satellite System.

[3] This is the definition used in Article 2 of Decision No 626/2008/EC of the European Parliament and of the Council of 30 June 2008 on the selection and authorisation of systems providing mobile satellite services (MSS).

ESOMP - INSTALLATION AND USE OF SATELLITE EARTH STATION(S) ON MOBILE PLATFORMS ("ESOMPs") ON BOARD AN AIRCRAFT

B1. Where the equipment listed in Clause 2 of the Licence includes sending and receiving Earth Station(s) on Mobile Platforms ("ESOMPs") on board an aircraft for the purpose of providing wireless telegraphy links between the ESOMP and Satellite(s) (together the "Radio Equipment"), the following terms and conditions shall apply.

(a) The ESOMP Equipment shall be operated on a 'non-interference non-protected' basis: that is, the use of the ESOMP Equipment shall not cause harmful interference to and shall not claim protection against harmful interference from any other radio communication service operating in accordance with Article 5 of the Radio Regulations, wherever that other service may be operating;

(b) Within the airspace of the UK, the Channel Islands[4] or the Isle of Man, the licensee may operate the ESOMP Equipment only in the frequency bands identified below:

(i) 27.5 – 27.8185 GHz, 28.4545 – 28.8265 GHz and 29.4625 – 30 GHz for transmission (Earth-to-space)

(ii) 17.3 – 20.2 GHz for reception (space-to-Earth)

(c) Outwith the airspace of the UK, the Channel Islands and the Isle of Man, the licensee may operate the ESOMP Equipment in any part of the frequency band 27.5 – 30 GHz;

(d) Within the airspace of an administration other than the UK, the Channel Islands or the Isle of Man, the ESOMP Equipment shall be used in accordance with the relevant regulations and authorisations of that administration;

(e) Means shall be used to allow transmissions of the ESOMP Equipment to be identified;

(f) The operation of the ESOMP Equipment shall comply with the essential requirements of the Radio Equipment Directive (Directive 2014/53/EU) and with the technical and operational criteria contained within the UK Interface Requirement 2093;

(g) The ESOMP Equipment must comply with (and be maintained in accordance with) the relevant performance specification(s) published by the operator(s) of the Satellite(s).

Interpretation

(a) "Earth Station" means a station for transmitting and receiving wireless telegraphy intended for communication with one or more satellites;

(b) "Radio Regulations" means the 2012 edition of the Radio Regulations made under Article 13 of the Constitution of the International Telecommunication Union;

(c) "Radio Equipment Directive" means Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment;

(d) "UK Interface Requirement IR 2093" means the UK Interface Requirement 2093 – Earth Stations on Mobile Platforms (ESOMPs) published by Ofcom in accordance with Article 8 of the Radio Equipment Directive;

(e) all technical terms, unless the contrary intention appears, shall have the meaning assigned to them in the Radio Regulations.

Note

This authorisation 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 ESOMP, notably outside the territory of the UK, the Channel Islands and the Isle of Man. The Licensee is encouraged to seek its own independent professional advice in this respect.

[4] The Bailiwick of Jersey and the Bailiwick of Guernsey

WAS/Wi-Fi - Installation and use of a satellite earth station and wireless access points on board the aircraft

C1. Where the equipment listed in Clause 2 of the licence includes Wireless Access Point equipment and Satellite Earth Station on Aircraft, as described in the table below (together, "the WAS/Wi-Fi Equipment"), the terms and conditions in Clauses C2 to C4, below, shall apply.

	Equipment description	Frequency range	
		From	To
1	Wireless Access Point	2412 MHz	2472 MHz
2	Wireless Access Point	2457 MHz	2472 MHz
3	Wireless Access Point	5150 MHz	5350 MHz
4	Wireless Access Point	5470 MHz	5725 MHz
5	Satellite Earth Station on Aircraft	14 GHz	14.5 GHz

C2. In relation to the use of the Wireless Access Point apparatus, described in rows 1 to 4 of the above table ("the Wireless Access Point apparatus"),

(a) The Licence does not authorise the use of the Wireless Access Point apparatus described in rows 1 and 2 of the table in Clause 1, above, when the Aircraft is in or over (or for the time being in or over) the United Kingdom or any of the Crown Dependencies (including, in each case, their territorial seas). Such use must be in accordance with applicable exemption regulations;

(b) When the Aircraft is in or over (or for the time being in or over) the United Kingdom or any of the Crown Dependencies (including, in each case, their territorial seas), the use of the Wireless Access Point apparatus described in rows 3 and 4 of the table in Clause 1, above must be in accordance with applicable exemption regulations, save that airborne use is authorised;

(c) The use of the Wireless Access Point apparatus, described in rows 1 to 4 of the table in Clause 1, above, must be in conformity with applicable provisions of Interface Requirement IR 2030, published by Ofcom;

C3. In relation to the use of the Satellite Earth Station, described in row 5 of the table above ("the Satellite Earth Station"), the following shall apply:

(a) When the Aircraft is in or over (or for the time being in or over) the United Kingdom or any of the Crown Dependencies (including, in each case their territorial seas) the Satellite Earth Station may be used only if authorised to do so under a "Satellite (Earth Station Network)" Licence issued to the operator of the earth station network; and only in the frequency band between 14 GHz and 14.25 GHz;

(b) The Satellite Earth Station may transmit with an e.i.r.p. no greater than 55 dBW;

(c) If operating to a geostationary satellite, the Satellite Earth Station must employ a stabilised platform and must maintain a pointing accuracy +/− 0.2 degrees towards the relevant geostationary satellite throughout transmissions;

(d) At angles greater than or equal to 2.5 degrees from the antenna main beam axis, the e.i.r.p. of the Satellite Earth Station, if operating to a geostationary satellite, shall not exceed 20 dBW/40 kHz;

(e) All transmissions from the Satellite Earth Station must be clearly identifiable;

(f) The Satellite Earth Station must at all times operate such that it conforms to Interface Requirement IR 2077, published by Ofcom.

C4. The following conditions apply to all of the WAS/Wi-Fi Equipment

(a) When in or over (or for the time being in or over) a country other than the United Kingdom or any of the Crown Dependencies, the WAS/Wi-Fi Equipment may be used only as permitted or directed by the authorities in that country;

(b) The Licensee may not claim protection from interference caused to any of the WAS/Wi-Fi Equipment by any authorised use of radio;

(c) The WAS/Wi-Fi Equipment must at all times be operated such that it does not cause harmful interference to other authorised uses of radio anywhere in the world. For the avoidance of doubt, this includes other authorised uses of radio on the surface of the Earth, in the air or in space;

(d) If the Licensee or the captain of the Aircraft (or the person for the time being in charge of the Aircraft) becomes aware that the operation of the WAS/Wi-Fi Equipment is causing harmful interference to any other authorised use of radio, he must switch the WAS/Wi-Fi Equipment off or take such other measures as may be necessary to cause the harmful interference to cease;

(e) The Licensee or the captain of the Aircraft (or the person for the time being in charge of the Aircraft) must cause the operation of the WAS/Wi-Fi Equipment to be modified or restricted or closed down permanently or temporarily if, in the reasonable opinion of a person authorised by Ofcom it is causing or contributing to harmful interference to any other authorised use of radio.

Interpretation

(a) “the WAS/Wi-Fi Equipment” means all of the equipment listed in the table above;

(b) “the Aircraft” means the aircraft bearing the Aircraft Registration in the table at the top of the Licence;

(c) “the Licence” means this Aircraft Radio Licence; and

(d) “the Station” means the aircraft station of the Aircraft and any apparatus for wireless telegraphy associated with it.

Notes *(these notes do not form part of the authorisation)*

(a) In or over the UK or Crown Dependencies the WAS/Wi-Fi Equipment must be used under and in accordance with the terms and conditions of applicable exemption regulations or a “Satellite (Earth Station Network) Licence” (issued by Ofcom to the operator of the earth station network), as may apply. It is the responsibility of the operator or the captain of the aircraft to ensure that the WAS/Wi-Fi Equipment is properly authorised

Mobile Communications on Aircraft

D1. Where the equipment listed in Clause 2 of the Licence includes and aircraft base transceiver station (aircraft BTS) and network control unit (NCU) (together, "the MCA Equipment"), as described in the Table 1, the terms and conditions, below, shall apply.

Table 1

Type	Frequency	System
GSM 1800	1710 - 1785 MHz (uplink) 1805 - 1880 MHz (downlink)	GSM complying with the GSM Standards as published by ETSI, in particular EN 301 502, EN 301 511 and EN 302 480, or equivalent specifications.
UMTS 2100 (FDD)	1920 -1980 MHz (uplink) 2110 - 2170 MHz (downlink)	UMTS complying with the UMTS Standards as published by ETSI, in particular EN 301 908-1, EN 301 908-2, EN 301 908-3 and EN 301 908-11, or equivalent specifications.
LTE 1800 (FDD)	1710 - 1785 MHz (uplink) 1805 - 1880 MHz (downlink)	LTE complying with LTE Standards, as published by ETSI, in particular EN 301 908-1, EN 301 908-13, EN 301 908-14, and EN 301 908-15, or equivalent specifications.

(a) The relevant network must only be used for mobile communication services on aircraft;

(b) The relevant network shall be operated on a 'non-interference, non-protected' basis;

(c) The relevant network shall only be switched on when the aircraft is 3000 metres or more above the ground;

(d) The aircraft BTS shall only operate in the frequency bands listed in Table 1;

(e) The aircraft BTS shall ensure that all apparatus connecting to the aircraft BTS complies with the operational requirements as specified in Regulation 5 of The Wireless Telegraphy (Mobile Communication Services on Aircraft) (Exemption) Regulations 2017. The operational requirements are:

i. the aircraft BTS, while in operation, shall limit the transmission power of all GSM apparatus to a nominal value of 0 dBm/200 kHz at all stages of communication, including initial access;

ii. the aircraft BTS, while in operation, shall limit the transmission power of all LTE apparatus in the 1800 MHz band to a nominal value of 5 dBm/5 MHz at all stages of communication; or

iii. the aircraft BTS, while in operation, shall limit the transmission power of all UMTS apparatus in the 2100 MHz band to a nominal value of -6 dBm/3.84 MHz at all stages of communication and the maximum number of users does not exceed 20; or

iv. where the e.i.r.p outside the aircraft emanating from the apparatus transmitting in the frequency bands specified in Table 2, below, does not, at each of the heights above ground specified in Column 1 of that Table, exceed the value specified in each of Columns 2, 3 or 4 of that Table.

(f) Apparatus receiving within the frequency bands 925 – 960 MHz and 2110 – 2170 MHz shall be prevented from attempting to register to networks on the ground either:

i. by the deployment of an NCU, which raises the noise floor inside the cabin; or

ii. by sufficient fuselage shielding to further attenuate the signal entering and leaving the fuselage.

(g) The relevant network shall operate such that the total e.i.r.p of the network control unit outside the aircraft for the frequency band 925–960 MHz does not, at each height above ground specified in Column 1 of Table 3 below, exceed the value specified in Column 2 of that Table;

(h) The relevant network shall operate such that the total e.i.r.p of the aircraft BTS outside the aircraft for the frequency band 1805–1880 MHz does not, at each height above ground specified in Column 1 of Table 3 below, exceed the value specified in Column 3 of that Table;

(i) The relevant network shall operate such that the total e.i.r.p of the network control unit and the aircraft BTS outside the aircraft for the frequency band 2110–2170 MHz does not, at each height above ground specified in Column 1 of Table 3 below, exceed the value specified in Column 4 of that Table;

(j) Where the NCU operates in a frequency band listed in heading of Columns 2 to 5 of Table 4, below, the relevant network shall operate such that the total e.i.r.p outside the aircraft does not, at each height above the ground

specified in Column 1 of that Table and at each of those frequency bands, exceed the value specified in Columns 2 to 5 of that Table;

(k) The relevant network shall comply with the ETSI Standards[5] listed in Table 1 above;

(l) Operation of the relevant network within the territory of administrations other than the UK, Isle of Man, Guernsey or Jersey, or their respective territorial sea, or, radio equipment on board an aircraft registered within the territory of administrations other than the UK, Isle of Man, Guernsey or Jersey, is subject to the regulations and authorisations of those administrations.

Table 2

Column 1 Height above ground (in metres)	**Column 2 Maximum e.i.r.p, defined outside the aircraft, resulting from the GSM apparatus in dBm/channel**	**Column 3 Maximum e.i.r.p, defined outside the aircraft, resulting from the LTE apparatus in dBm/channel**	**Column 4 Maximum e.i.r.p, defined outside the aircraft, resulting from the UMTS apparatus in dBm/channel**
	1800 MHz	**1800 MHz**	**2100 MHz**
3000	-3.3	1.7	3.1
4000	-1.1	3.9	5.6
5000	0.5	5	7
6000	1.8	5	7
7000	2.9	5	7
8000	3.8	5	7

Table 3

Column 1 Height above ground (in metres)	**Column 2 Maximum e.i.r.p of the network control unit outside the aircraft for the frequency band 925–960 MHz, (in dBm per 3.84 MHz)**	**Column 3 Maximum e.i.r.p of the aircraft BTS outside the aircraft for the frequency band 1805–1880 MHz (in dBm per 200 kHz**	**Column 4 Maximum e.i.r.p of the network control unit and the aircraft BTS outside the aircraft for the frequency band 2110-2170 MHz, (in dBm per 3.84 MHz)**
3000	-6.2	-13.0	1.0
4000	-3.7	-10.5	3.5
5000	-1.7	-8.5	5.4
6000	-0.1	-6.9	7.0
7000	1.2	-5.6	8.3
8000	2.3	-4.4	9.5

Table 4

Column 1 Height above ground (in metres)	**Column 2 Maximum e.i.r.p of the network control unit and the aircraft BTS outside the aircraft for the frequency band 460-470 MHz, (in dBm per1.25 MHz)**	**Column 3 Maximum e.i.r.p of the network control unit and the aircraft BTS outside the aircraft for the frequency band 791-821 MHz, (in dBm per 10 MHz)**	**Column 4 Maximum e.i.r.p of the network control unit and the aircraft BTS outside the aircraft for the frequency band 1805-1880 MHz, (in dBm per 200 kHz)**	**Column 5 Maximum e.i.r.p of the network control unit and the aircraft BTS outside the aircraft for the frequency band 2570-2690 MHz, (in dBm per 4.75 MHz)**
3000	-17.0	-0.87	-13.0	1.9

[5] Commission Decision 2016/2317/EU, OJEU No L 345, 20.12.2016, p 67, provides that “equivalent specifications” to ETSI’s standards may also be used. As such equivalent standards become available, Ofcom will amend this provision to make reference to them.

4000	-14.5	1.63	-10.5	4.4
5000	-12.6	3.57	-8.5	6.3
6000	-11.0	5.15	-6.9	7.9
7000	-9.6	6.49	-5.6	9.3
8000	-8.5	7.65	-4.4	10.4

Interpretation

(a) "aircraft BTS" means a base transceiver station located in an aircraft;

(b) "apparatus" means wireless telegraphy apparatus;

(c) "dBm" means decibels of power referenced to one milliWatt;

(d) "e.i.r.p" means equivalent isotropic radiated power;

(e) "ETSI" means the European Telecommunications Standards Institute;

(f) "GSM apparatus" means apparatus used for an electronic communications network that complies with standards developed for Global System for Mobile Communications (also known as GSM) referred to in regulation 5(2)(a);

(g) "kHz" means kilohertz;

(h) "LTE apparatus" means apparatus used for an electronic communications network that complies with standards developed for Long Term Evolution (also known as LTE) referred to in regulation 5(2)(c);

(i) "MHz" means megahertz;

(j) "mobile communication services on aircraft" means electronic communications services provided by an undertaking to enable airline passengers to use public electronic communications networks during flight without establishing direct connections with electronic communications networks based on land;

(k) "network control unit" means equipment located in an aircraft that ensures that signals transmitted by ground based mobile electronic communication systems are not detectable within the cabin by raising the noise floor inside the cabin in mobile communication receive bands;

(l) "public electronic communications network" has the meaning given to it by section 151(1) of the Communications Act 2003[6];

(m) "relevant network" means an electronic communications network that includes an aircraft BTS and a network control unit;

(n) "signal" has the meaning given to it by section 32(10) of the Communications Act 2003;

(o) "the 1800 MHz band" means the 1710–1785 MHz frequency band (for the uplink from the apparatus to the aircraft BTS) and the 1805–1880 MHz frequency band (for the downlink from the aircraft BTS to the apparatus);

(p) "the 2100 MHz band" means the 1920–1980 MHz frequency band (for the uplink from the apparatus to the aircraft BTS) and the 2110–2170 MHz frequency band (for the downlink from the aircraft BTS to the apparatus); and

(q) "UMTS apparatus" means apparatus used for an electronic communications network that complies with standards developed for Universal Mobile Telecommunications System (also known as UMTS) referred to in regulation 5(2)(b).

[6]2003 c.21.

ATC TRANSPONDER Non FRTOL Holder

If the equipment listed in Clause 2 of the Licence includes an ATC Transponder, then provisions in the Licence requiring a person who uses the Station to hold (or be under the direct supervision of a person who holds) a Flight Radio Telephony Operator Certificate do not apply, insofar as they relate to the use of the Transponder, as long as the person has no control over the operation of the Transponder, other than to switch it on and off.

(a) Where the Licence is an Aeronautical Transportable Radio Licence, the Transponder must:

(i) conform to the Essential Requirements of Directive 2014/53/EU; or

(ii) have the appropriate approval, granted by (or on behalf of) the CAA or EASA