

ENHANCED LONG-RANGE NAVIGATION (ELORAN) LICENCE

Licence no:	1338047/1
Date of issue:	01 01 2024
Fee payment date:	31 December
Payment Interval	Every 12 months from 31 December 2023

1. The Office of Communications (Ofcom) grants this wireless telegraphy licence ("the Licence") to

HELLEN SYSTEMS
(Company registration number **13339696**)

("the Licensee")

HELLEN SYSTEMS
107 WEST FEDERAL STREET MIDDLEBURG, VIRGINIA
20117
USA

to establish, install and use wireless telegraphy stations and/or wireless telegraphy apparatus as described in the schedules to this Licence (together "the Radio Equipment") subject to the terms set out below.

Licence Term

2. This Licence shall continue in force until revoked by Ofcom or surrendered by the Licensee.

Licence Variation and Revocation

3. 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, or with the consent, of the Licensee;
 - b) if there has been a breach of any of the conditions of this Licence;
 - c) if, in connection with the transfer or proposed transfer of rights and obligations arising by virtue of the Licence, there has been a breach of any provision of regulations made by Ofcom under the powers conferred by section 30(1) and (3) of the Act¹;

¹ These are regulations on spectrum trading.

- d) in accordance with schedule 1 paragraph 8(5) of the Act;
 - e) 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;
 - f) for reasons related to the management of the radio spectrum, provided that in such a case the power to revoke may only be exercised after at least five years' notice is given in writing.
4. Where Ofcom exercises its 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.

Transfer

5. The Licence may not be transferred. The transfer of rights and obligations arising by virtue of this Licence may however be authorised in accordance with regulations made by Ofcom under powers conferred by section 30 of the Act².

Changes to Licensee details

6. 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.

Fees

7. The Licensee shall pay to Ofcom the relevant sums as provided in section 12 of the Act and the regulations made thereunder:
- i) on or before the date of issue of this Licence; and
 - ii) on or before the payment date shown on this Licence for subsequent payments or 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 this Licence.
8. If the Licence is surrendered, revoked or varied, no refund, whether in whole or in part, of any amount which is due under the terms of this Licence, payable in accordance with the Regulations, or provided for in any regulations made by Ofcom under sections 12 and 13(2) of the Act will be made, except at the absolute discretion of Ofcom.

Radio Equipment Use

9. The Licensee shall ensure that the Radio Equipment is 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.

² See Ofcom's website for the latest position on spectrum trading and the types of trade which are permitted.

10. The Licensee shall ensure that the Radio Equipment is operated in compliance with the terms of this Licence and is used only by persons who have been authorised in writing 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.
11. The Licensee must ensure that all Radio Equipment is established, installed, modified and used only in accordance with the provisions specified in schedule 3 (EMF Licence Condition) of this Licence.

Access and Inspection

12. The Licensee shall permit any person authorised by Ofcom:
 - a) to have access to the Radio Equipment; and
 - b) to inspect the Licence and 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 that the Radio Equipment is being used in accordance with the terms of this Licence.

Modification, Restriction and Closedown

13. Any 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 use of other authorised radio equipment.
14. 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.

Geographical Boundaries

15. Subject to the requirements of any co-ordination procedures notified to the Licensee, the Licensee is authorised to establish, install and use the Radio Equipment at the locations listed in, and in accordance with, the schedule(s) to this Licence.

Interpretation

16. In this Licence:
 - a) the establishment, installation and use of the Radio Equipment shall be interpreted as establishment and use of wireless telegraphy stations and installation and use of wireless telegraphy apparatus for wireless telegraphy as specified in section 8(1) of the Act;
 - b) the expression "undue interference" shall have the meaning given by section 115 of the Act;

- c) the expressions “wireless telegraphy station” and “wireless telegraphy apparatus” shall have the meanings given by section 117 of the Act;
- d) the schedule(s) form part of this Licence together with any subsequent schedule(s) which Ofcom may issue as a variation to this Licence; and
- e) the Interpretation Act 1978 shall apply to the Licence as it applies to an Act of Parliament.

Issued by Ofcom

Office of Communications

COPY

SCHEDULE 1

Licence category: Enhanced Long-Range Navigation (eLoran) Licence

Description of Radio Equipment

1. References in this schedule to the Radio Equipment are references to any wireless telegraphy station or wireless telegraphy apparatus that is established, installed and/or used under this schedule.

Special conditions relating to the Radio Equipment

2.
 - a) The Radio Equipment will operate on a non-interference and non-protected basis. For the avoidance of doubt, this means that the Licensee may not claim protection from and must not cause undue interference to other authorised uses of radio spectrum.
 - b) The Licensee must ensure that eLoran transmission signal pulses, including the duration between pulses, are designed and operated in a way which will not cause undue interference to eLoran services operated by or on behalf of the UK Government.
 - c) The radio frequency band authorised by this Licence is shared and must be used in common with other eLoran systems authorised under wireless telegraphy licences granted by Ofcom and together with the Licensee are described as the "eLoran Licensees".
 - d) The Licensee must liaise, co-operate and co-ordinate with all eLoran Licensees (if necessary adjusting transmission power and other technical parameters of transmission such as the Group Repetition Interval), such that each eLoran system (comprising the transmitter stations and user terminals) can coexist and operate without causing undue interference to each other, so that eLoran services can be provided to end users from each eLoran system.
 - e) The Licensee shall submit to Ofcom in such manner and within such period as specified by Ofcom, any information in relation to the Radio Equipment, or any wireless telegraphy station or wireless telegraphy apparatus which the Licensee is planning to use, as Ofcom may from time-to-time request. Such information may include, but is not limited to, information in relation to the radio frequency, transmitted power and date of first use for wireless telegraphy stations or wireless telegraphy apparatus to be established, installed or used within such timeframe and in such areas as Ofcom may reasonably request.

Technical conditions

Transmitter(s)	
Permitted Frequency Block	90 – 110 kHz
Centre Frequency	100 kHz
Bandwidth	20 kHz
Class of emission	20K0V1X
Maximum Peak Radiated Power (EIRP):	60 dBW
Transmit signal emission profile	99% or more of the total radiated power must be contained within the 90 - 110 kHz band. The total power outside the 90-110 kHz band shall be 1% or less of the total radiated power. The power below 90 kHz shall be no greater than 0.5% and the power above 110 kHz shall be no greater than 0.5% of the total radiated power.
Transmitter locations	As listed in schedule 2

Co-ordination between eLoran licensees

3. The Licensee shall ensure that the Radio Equipment is operated in compliance with the co-operation and co-ordination conditions set out in this schedule and any other co-ordination procedures as may be notified to the Licensee by Ofcom from time to time.

International cross-border co-ordination

4. The Licensee shall ensure that the Radio Equipment is co-ordinated with other international eLoran systems to ensure undue interference is not caused and operated in compliance with such cross-border co-ordination and sharing procedures as may be notified to the Licensee by Ofcom from time to time.

Interpretation of terms in this schedule

5. In this schedule:
 - a) “non-interference, non-protected” means that no harmful interference may be caused to any radiocommunication services that are entitled to protection and that no claim may be made for protection of the Radio Equipment against harmful interference originating from authorised uses of radio;
 - b) “Class of emission” shall have the meaning given in Appendix 1 of the ITU Radio Regulations;
 - c) “dBW” means the power level in decibels (logarithmic scale) referenced against 1 watt (i.e. a value of 0 dBW is 1 Watt);
 - d) “EIRP” means the equivalent isotropically radiated power. This is the product of the power supplied to the antenna and the antenna gain in a given direction relative to an

isotropic antenna (absolute or isotropic gain), measured during the “on” part of the transmission;

- e) “Permitted Frequency Block” means the occupied bandwidth of the eLoran transmission signal within which 99% or more of the total transmitted power must be contained.

Ofcom

COPY

SCHEDULE 2

Licence category: **Enhanced Long-Range Navigation (Eloran) Licence**

Base station locations

1. The Licensee may establish, install and use transmitters in accordance with the following site details:

Station 1	
Name / Address of Transmitter Station Site	HELLEN SYSTEMS ELORAN TX 1 SWINGATE NR DOVER CT15 5DL UK
Transmitter Station Location (NGR)	TR 33416 42919
Peak Radiated Power, EIRP (dBW)	60 dBW

SCHEDULE 3

EMF Licence Condition

Licence category: Enhanced Long-Range Navigation (eLoran) Licence

Schedule Date: 01 01 2024

Licence category: Enhanced Long-Range Navigation (eLoran) Licence

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 restrictions³ in the relevant tables for general public exposure identified in the ICNIRP Guidelines⁴ 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:
 - a) the total electromagnetic field exposure levels produced by the Licensee's On-Site Radio Equipment, together with
 - b) 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 restrictions⁵ in the relevant tables for general public exposure identified in the ICNIRP Guidelines⁶ 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

³ Compliance with the reference levels for general public exposure identified in the ICNIRP Guidelines will ensure compliance with the basic restrictions.

⁴The relevant tables for general public exposure are identified in Ofcom's "Guidance on EMF Compliance and Enforcement".

⁵ Compliance with the reference levels for general public exposure identified in the ICNIRP Guidelines will ensure compliance with the basic restrictions.

⁶ The relevant tables for general public exposure are identified in Ofcom's "Guidance on EMF Compliance and Enforcement".

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 an emergency situation (in the vicinity of that situation) including for search and rescue activities and maritime emergency communications.⁷

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:
 - a) "**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;
 - b) "**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;
 - c) "**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;
 - d) "**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 or otherwise acting for purposes connected with their trade, business or profession or the performance by them of a public function;⁸
 - e) "**ICNIRP Guidelines**" means the version of the Guidelines published by the International Commission on Non-Ionizing Radiation Protection for limiting exposure

⁷ Further information on emergency situations is set out in Ofcom's "Guidance on EMF Compliance and Enforcement".

⁸ 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): [The Control of Electromagnetic Fields at Work Regulations 2016](#), [The Control of Electromagnetic Fields at Work Regulations \(Northern Ireland\) 2016](#) and [The Merchant Shipping and Fishing Vessels \(Health and Safety at Work\) \(Electromagnetic Fields\) Regulations 2016](#).

to electromagnetic fields which are identified in Ofcom's "Guidance on EMF Compliance and Enforcement" that is in force at the relevant time.⁹

- f) **"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.¹⁰
- g) **"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.
- h) **"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 direction¹¹ that is higher than 100 Watts EIRP or 61 Watts ERP;¹²
 - 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;¹³
 - 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;
- i) **"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;
- j) **"site"** means a physical structure, building, vehicle or moving platform;
- k) **"wireless telegraphy apparatus"** has the meaning given to it in section 117 of the Wireless Telegraphy Act 2006; and

⁹ 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): [The Control of Electromagnetic Fields at Work Regulations 2016](#), [The Control of Electromagnetic Fields at Work Regulations \(Northern Ireland\) 2016](#) and [The Merchant Shipping and Fishing Vessels \(Health and Safety at Work\) \(Electromagnetic Fields\) Regulations 2016](#).

¹⁰ 10 Watts EIRP is equivalent to 6.1 Watts ERP. In linear units $EIRP (W) = 1.64 \times ERP (W)$; 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".

¹¹ 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.

¹² 100 Watts EIRP is equivalent to 61 Watts ERP.

¹³ The relevant tables for general public exposure are identified in Ofcom's "Guidance on EMF Compliance and Enforcement".

- l) **“wireless telegraphy station”** has the meaning given to it in section 117 of the Wireless Telegraphy Act 2006.

Ofcom

COPY