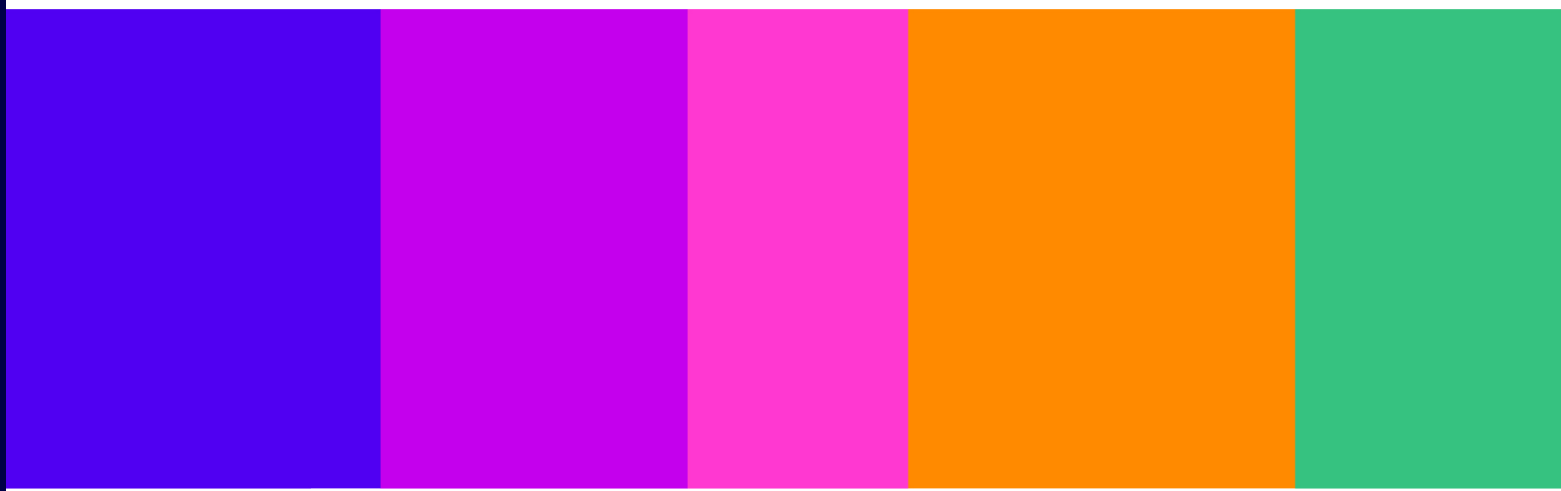


Spectrum access for Enhanced Long-Range Navigation (eLoran) systems at 90-110 kHz

Supporting innovation for more resilient Positioning,
Navigation and Timing

Statement

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1. Overview

- 1.1 This document sets out our decision on proposals to make radio spectrum in the 90-110 kHz frequency range available for Enhanced Long-Range Navigation (eLoran) systems.
- 1.2 eLoran technology can provide a terrestrial-based alternative, complement or backup to satellite-based positioning, navigation and timing (PNT) systems such as GPS (Global Positioning System).
- 1.3 We are aware of interest in developing a commercial eLoran service in the UK. However, at present, there is no Ofcom licence product available to operators which is suitable for authorising the deployment of the service.
- 1.4 For that reason, we published a consultation document on 19 May 2023 ('the May 2023 consultation') setting out proposals for the introduction of a new 'Enhanced Long-Range Navigation (eLoran) licence' (the 'eLoran licence') for the 90-110 kHz spectrum band.

What we have decided – In brief

Having carefully considered all responses to the consultation we have decided to proceed with our proposals to introduce a new licence product authorising eLoran in the 90-110 kHz spectrum band.

Taking account of consultation responses and our own further considerations, we have made two changes to the licence conditions we proposed in the May 2023 consultation:

- Increased the notice period for licence revocation to 5 years. The licences will be issued for an indefinite period, and may only be revoked on spectrum management grounds subject to a minimum of five years notice. This is an increase from the three years notice period proposed in the May 2023 consultation and is to provide greater certainty of tenure for investors and operators.
- Increased the maximum EIRP permitted from any single transmitter to 1 MW (60 dBW). This represents a 4 dB increase from the maximum EIRP of 400 kW proposed in the May 2023 consultation and will allow the eLoran signals to be received in hard-to-reach areas such as in tunnels and deep inside buildings.

Any operators wishing to establish an eLoran system in the UK may now apply to Ofcom for a licence. Licences will be issued to operators on completion of an application form and payment of the licence fee.

2. Background and summary of our proposals

- 2.1 eLoran is a terrestrial-based positioning, navigation and timing (PNT) system using transmitters operating within the 90-110 kHz band to provide a ground-based alternative, complement or back-up to PNT delivered via existing Global Navigation Satellite Systems (GNSS), such as GPS.
- 2.2 Accurate PNT is important for all people and businesses in the UK to:
- provide precise **positioning** information, such as for the security-tracking and civil engineering sectors;
 - help our **navigation** wherever we are in the world, such as for the maritime and aviation sectors; and
 - provide highly accurate **timing**, which forms an essential part of modern communications networks, broadcasting and financial services.
- 2.3 Satellite-based systems can be susceptible to interference and can be vulnerable to space weather events. Additionally, there are areas that satellite-based systems cannot reach, such as deep inside buildings or in underground areas.
- 2.4 An eLoran system can provide an alternative. Its use of low frequency band spectrum enables the transmission of signals capable of travelling very long distances, with an operational range of more than 1,200 miles, and into places that GPS and similar systems find hard to reach.
- 2.5 Our [May 2023 consultation](#) acknowledged the potential benefits an innovative eLoran system could deliver, but noted there was no suitable licence product available to authorise its UK deployment in the 90-110 kHz band.
- 2.6 The consultation therefore set out proposals for the introduction of a new Enhanced Long-Range Navigation (eLoran) licence (the 'eLoran licence'), including the technical and non-technical licence conditions we considered necessary.
- 2.7 Although the 90-110 kHz band is mainly allocated for civilian use, we noted some eLoran use by the Ministry of Defence (MOD), based at present on a site at Anthorn in Cumbria. This use currently falls under a Crown licence exemption. We understand the UK Government intends to maintain its eLoran capability.
- 2.8 Our May 2023 consultation noted the potential for more than one eLoran system to be in operation at any one time, including overseas, and took coexistence issues into account in our proposals. We published our proposed licence as an annex to the May 2023 consultation and invited stakeholders to comment on the proposed licence conditions.

3. Assessment of consultation responses

- 3.1 We received 14 responses to the May 2023 consultation. Two of those responses were submitted confidentially and two of the others included confidential sections. The [non-confidential responses](#) are published on our website.
- 3.2 No respondents submitted objections to our core proposal to introduce a new licence product for e-Loran in the 90-110 kHz band. However, some respondents questioned specific aspects of the licence conditions we proposed.
- 3.3 The main comments were that our proposal for a notice period of three years for any revocation of licences on spectrum management grounds was too short; and that the maximum transmission power we proposed was too low.
- 3.4 An organisation representing the amateur radio community (the RSGB¹) said it supported our proposal for an e-Loran licence ‘in principle’, but expressed concern about the potential impact a proliferation of eLoran systems could have on the amateur band in the nearby 136 kHz frequencies.
- 3.5 We have taken all responses into account in reaching our decisions on introducing a new eLoran licence . A sample licence, setting out the revised non-technical and technical licence conditions we will apply can be found at annex 1 of this statement. A summary of the legal context for our decisions is at annex 2.
- 3.6 In the sub-sections below, we address in more detail the comments made by stakeholders in response to our proposals. Under each heading we set out our own assessment of the main points raised and outline the decisions we have taken.

Authorisation of the 90-110 kHz band for eLoran

- 3.7 Our May 2023 consultation said we considered eLoran to be a niche market at present and we did not therefore anticipate a wide demand for licences. As a result, we did not propose to limit the number of licences we issue. We said licences would become available on application and payment of the relevant licence fee.
- 3.8 We noted that the 90-110 kHz band forms part of a wider series of bands that are also available on a licence exempt basis for Short Range Devices (SRDs). This means devices may access spectrum on the basis that users cause no undue interference to other users and can expect no protection from undue interference themselves.²

¹ The Radio Society of Great Britain

² Ofcom has published a [Short-Range Devices Information Sheet](#) on its website. It states: “SRDs cannot claim protection from other authorised services, SRD or, generally, from other spectrum users and must not cause harmful interference themselves”.

- 3.9 We noted that SRDs are already designed to operate within a wider radio frequency environment which includes high power transmitters in the low frequency spectrum, such as broadcast stations.
- 3.10 We also noted the existence of the Ministry of Defence (MOD) eLoran facility at Anthorn in Cumbria, which is operating under a Crown licence exemption.³
- 3.11 We said we were not aware of other potential technologies which might wish to make use of the 90-110 kHz band. We invited stakeholders to respond to the following questions on our proposed authorisation of the 90-110 kHz band for eLoran:

Question 1: Do you agree in principle with our proposal to introduce a new licence product to enable authorisation of the use of the 90-110 kHz band for eLoran services?

Question 2: Are you aware of any alternative current or future uses for the 90-110 kHz band, including any which might preclude use of these frequencies for eLoran? If so, please provide details.

Consultation responses

- 3.12 The overwhelming majority of responses (13 out of 14) either supported our proposals to introduce a new eLoran licence product in full or agreed in principle. The other respondent, which submitted its response in confidence, [REDACTED], offered ‘no comment’ on question 1.
- 3.13 Four respondents (Thomas Howe, Hoptroff Smart Timing, the Royal Institute of Navigation and Chronos) noted that eLoran could deliver support to the UK’s critical national infrastructure and provide resilience in the event of a significant outage to global navigation satellite systems, like GPS.
- 3.14 The Royal Institute of Navigation noted that positioning system resilience for UK critical infrastructure and transport needed to be improved. It said there was no single system that can provide all the answers, but that eLoran had some unique advantages.
- 3.15 RethinkPNT, highlighted that a licence product for the 90-110 kHz band would enable commercial services to be developed, strengthening the ability of the UK to operate with resilient systems.
- 3.16 The General Lighthouse Authority (GLA) noted that LORAN systems in general were a proven means of achieving independent positioning and timing information that can serve as a component of the ‘system-of-systems’ approach to maritime resilient PNT. A respondent who wished its name to be withheld [REDACTED] noted that eLoran would provide reliable “un-jammable and un-spoofable” positioning to vessels.
- 3.17 No stakeholders identified alternative current or future licensable uses for the 90-110 kHz band.

³ The Communications Act 2003 makes Ofcom responsible for management of radio spectrum in the UK except for spectrum used by Crown bodies. The MOD manages spectrum designated primarily for military use. Other relevant Crown bodies include the Department for Transport, the Department for Business and Trade, Department for Science Innovation and Technology and the Home Office (for some emergency services). The Scottish Government is responsible for managing some spectrum for emergency services in Scotland.

Ofcom assessment

- 3.18 Taking account of the almost unanimous support for the proposal set out in the May 2023 consultation we have decided to proceed with establishing a new eLoran licence for the 90-110 kHz band.
- 3.19 As noted above, we expect eLoran will continue to be a niche market and so we do not intend to limit the number of licences we issue. If this situation changes, we may give further consideration to our position. Licences will become available on application and payment of the relevant licence fee.

Non-technical licence conditions

- 3.20 In the May 2023 consultation, we proposed that licences should be issued for an indefinite duration, and with a three-year notice period for revocation if this was necessary for spectrum management reasons.
- 3.21 We noted that Ofcom has generally set a five-year notice period, but said the shorter period was appropriate in this case because of uncertainty surrounding future demand for eLoran services.
- 3.22 We said we considered our existing Earth Station Network licence to represent the closest current licensing regime to the one we proposed for the eLoran licence, and so proposed a similar approach to fees. This would mean a fee of £200 per year, based on recovering the cost of administration.
- 3.23 We invited stakeholders to respond to the following question on non-technical licence conditions.

Question 3: Do you agree with the non-technical conditions we propose to include in the new 90-110 kHz licence? Please set out your reasons and provide any relevant evidence.

Consultation responses

- 3.24 No respondents raised concerns about our general approach to non-technical licence conditions. However, a number of them questioned the proposed licence duration and, more specifically, the notice period for revocation. They warned of potential dampening of investment in eLoran if there was insufficient certainty over licence tenure.
- 3.25 There was particular unease around our proposal for a three-year notice period for licence revocation on spectrum management grounds.
- 3.26 Chronos highlighted that, while the granting of indefinite licences would help encourage investment, the three-year notice period may deter some critical national infrastructure sectors, given they will have complex implementation paths.
- 3.27 Instead, the respondent was of the view that a 10-year initial period in which the licences could not be revoked would be appropriate, followed by a seven-year notice period for revocation, if necessary, on the grounds of spectrum management. This view was broadly echoed by Hoptroff Smart Timing and the Royal Institute of Navigation, who noted that confidence in the supply chain was vital.
- 3.28 Two respondents who wished their comments on this issue to remain confidential [REDACTED] made similar points and said Ofcom should revert to the 'standard' five-year notice period for revocation.

- 3.29 One of those respondents [§<REDACTED] highlighted that the service life of an eLoran transmitter is estimated at 30 years. It added that, in addition to the investment required for radio equipment, there was the cost of associated infrastructure, including a tall tower for the antenna and other buildings/shelter.
- 3.30 The other confidential respondent [§<REDACTED] asked for a licence provision that would indicate that any decision to revoke the licence will be taken with due consideration to the effect on critical national infrastructure.
- 3.31 The RSGB said the proposed licence term should be attached to a ‘use it or lose it’ clause, or other time-related review provision.

Ofcom assessment

- 3.32 We have considered the arguments made by those respondents who suggested the proposed licence revocation period was too short.
- 3.33 It is important to note that the licence will be issued for an indefinite term, with the question of revocation only applying to circumstances where there are clear spectrum management reasons for authorising an alternative use of the frequencies. We would consult before issuing any revocation notices and consider all relevant factors, including any impact on critical national infrastructure.
- 3.34 We proposed a three-year notice period for revocation because we felt this would give us the greatest flexibility to reassign spectrum, given the uncertainty around future demand for eLoran and if alternative (and maybe more valuable) uses for the frequencies emerged in future – although we are not currently aware of any such possibility.
- 3.35 However, we acknowledge that the development and implementation of an eLoran system requires very significant investment, and that investors expect a reasonable period of certainty in which to realise a return.
- 3.36 It is therefore important that we strike the right balance between providing appropriate incentives for investment and innovation without unduly constraining our ability to react in a timely manner to possible changes in future spectrum demand.
- 3.37 Having carefully assessed the arguments presented by respondents and having re-considered this topic, we have concluded that a five-year notice period is justified in this case, rather than the three years proposed in the May 2023 consultation.
- 3.38 We have also considered whether we should establish an initial term during which the licence could not be revoked and a longer notice period for revocation, as suggested by one respondent.
- 3.39 We do not believe there should be an initial term or a longer period for notice of revocation because this could in future act as an unwarranted constraint on our ability to authorise alternative uses of the spectrum should they arise.
- 3.40 In summary, we have concluded that issuing the licences for an indefinite period, with a five-year notice period for revocation, strikes the right balance between providing incentive for investment and allowing flexibility for spectrum management.
- 3.41 We note that no respondents questioned our approach to licence fees. We have therefore decided to use the costs associated with administration of the Earth Station Network licence to determine our fee for the eLoran licence. This is currently £200 per year, based on a cost-recovery basis.

- 3.42 In respect to the suggestion by RSGB that a ‘use it or lose it’ clause should be applied to licences, we note that we considered this question in some detail in the May 2023 consultation.
- 3.43 We said it was not necessary to include such conditions in the licence because we were not proposing any limit on the number of licences we would issue, so the existence of any unused licence would not prevent another operator applying for one. Therefore, in line with our May 23 consultation, we have decided to proceed as proposed and not impose a ‘use it or lose it’ clause.
- 3.44 We note that no respondents raised points about any of our other proposed non-technical licence conditions. We have therefore decided to proceed on the basis of the proposals set out in the May 2023 consultation. These are detailed in the sample licence attached at Annex 1.

Technical licence conditions

- 3.45 In line with our statutory duties and the UKFAT⁴ we proposed that the licences would authorise the deployment of services on the principle that licensees must not cause interference to other users and can expect no protection from interference themselves (‘no interference no protection’).
- 3.46 In addition to this, we proposed to place the onus on licensees to cooperate and co-ordinate their operations with each other to avoid undue interference. In order to help achieve this we proposed to issue a single licence for each eLoran system to be deployed. Any licences we issue would be published on our website, with details of the transmission locations, so that any subsequent entrants can plan their own future deployments accordingly.
- 3.47 We also set out proposals on transmission power, including an initial maximum EIRP for each transmitter of 400 kW (56 dBW). However, we remained open to any arguments presented by stakeholders through the consultation process that this limit was too low (or too high).
- 3.48 We invited stakeholders to respond to the following question on technical licence conditions:

Question 4: Do you agree with the technical conditions we propose to include in the new 90-110 kHz licence? Please set out your reasons and provide any relevant evidence.

Consultation responses

- 3.49 Five respondents (Rethink PNT, Hoptroff Smart Timing, RIN, Chronos and one who wished its response on this to be confidential [REDACTED]) suggested the proposed EIRP limit of 400 kW (56 dBW) was not sufficient and could limit PNT applications in difficult to reach places, such as tunnels and basements.
- 3.50 The respondents advocated a higher EIRP, noting that modern eLoran transmitters are often sized to transmit at around 1 MW (60 dBW) in order to maintain a minimum ‘signal to noise’ ratio of 10dB for the different target/service area locations.
- 3.51 After reviewing these responses, and before we reached any decisions, we felt it was important to consider any technical evidence these respondents may have to support their

⁴ [UK Frequency Allocation Table \(UKFAT\) 2017](#) – UK Footnote 1.1.2

assertions. We therefore sent a request to them by email for any relevant additional information.

- 3.52 Four respondents replied to our request, and the evidence they supplied is noted in this summary of their consultation responses, alongside their original comments.
- 3.53 One of the respondents [§<REDACTED] argued that the proposal to limit the maximum EIRP of each transmitter to 400 kW would pose technological and performance issues. It said eLoran transmitters were designed to operate to a single EIRP, so subsequent modifications to transmitters to increase power (if that were to be permitted) would not be possible.
- 3.54 It said the primary goal of an eLoran service was to provide resilient PNT services where satellite navigation systems were unavailable, difficult, expensive to use, or highly susceptible to interference. It noted that eLoran had the advantage of overcoming these issues – but only if it was transmitted at the right power levels.
- 3.55 Instead, it argued, eLoran should ideally be transmitting with a maximum EIRP of 1 MW because this was necessary to ensure the appropriate signal to noise ratio in all potential use locations and ensure the accuracy of time synchronisation required for GNSS-equivalent services.
- 3.56 The respondent said its own modelling suggested that achieving good coverage in challenging environments with an EIRP of 400 kW would require twice as many transmission stations as doing so with an EIRP of 1 MW. The additional masts required at 400 kW EIRP would add significantly to the cost of provision of the service and have a significant impact on the environmental footprint of the network. All of this was unnecessary, it said, because the requirements of national and international cooperation and co-ordination to avoid undue interference can be met at 1 MW EIRP transmission just as well as at 400 kW EIRP.
- 3.57 The RIN too noted the trade-off between antenna density and transmitter power and that there may be advantages in having fewer antennas (transmitter sites) but with higher powers (i.e. greater than 400 kW). It cited work carried out at the [University of Bath](#) to support its position. The RIN said higher transmit power would, for example, provide better coverage of the North Sea for navigation.
- 3.58 Rethink PNT asked why Ofcom would seek to restrict the EIRP of a transmitter. It said receivers and service delivery quality was dependent directly on the signal to noise ratio, and a service provider should be free to vary power to ensure delivery, provided it stayed within the bounds of non-interference. It pointed out that transmitters available on the market are up to 4 MW, and suggested Ofcom's proposal was an arbitrary limit on service quality/delivery.
- 3.59 Along with other respondents, it pointed to overseas examples of higher power being used, including in South Korea and the USA.
- 3.60 Hoptroff Smart Timing said a key customer requirement was for reliable accurate timing, including in restrictive environments. Achieving this requires high fidelity data channel performance, and thus signal to noise ratio was critical. It pointed to academic study carried out at [Stanford University](#) to support its view that higher power was needed.
- 3.61 There were other comments about our proposed technical licence conditions.
- 3.62 A confidential respondent [§<REDACTED] said the use of EIRP has not normally been used to describe low frequency power ratings. Instead, it said, LORAN transmitters are rated by their Peak Radiated Power, which is roughly twice the average power of a pulse.

- 3.63 The RSGB said it was concerned about the emission mask proposed in the draft licence. It said any single transmitter could have 1% of radiated power from a single transmitter that could be 'out-of-band', of which 2 kW can directly affect the adjacent 136 kHz weak-signal amateur service allocation.
- 3.64 It was particularly concerned about the prospect of multiple transmitters with overlapping strong groundwave coverage, leading to even higher aggregated interference levels. It called for a tighter emission mask to be applied.
- 3.65 The GLA supported our proposals, noting its own long history and involvement with eLoran in terms of business case development, equipment specification and various tests/trials. However, it said eLoran should be defined in the licence and linked to an international standard (e.g. [SAE 9990](#), Sept 2018) to minimise the risk of interference and promote interoperability of systems.

Ofcom assessment

- 3.66 We have considered carefully the comments about EIRP limits and the further evidence and arguments presented by respondents. We have also noted the approach taken by other countries in considering eLoran and similar applications.
- 3.67 As a result, we acknowledge there is evidence to suggest that an EIRP limit of 400 kW may generate greater challenges for the optimal delivery of some of the different eLoran services/uses e.g. in tunnels and deep inside buildings.
- 3.68 We note that our duties under the Communications Act include giving regard to the desirability of encouraging investment and innovation. In doing so, we seek to impose restrictions only where necessary to protect other users of the spectrum. While an increased maximum EIRP could lead to a higher potential unwanted signal to another eLoran system in an interference scenario, the main method to ensure coexistence between different systems is through the careful planning of the respective pulse transmission groups i.e. the Group Repetition Intervals (GRIs) between different eLoran systems.
- 3.69 We note that the technical licence conditions included in the eLoran licence are designed to ensure licensees cooperate and co-ordinate their operations with each other to avoid undue interference. There is also a specific requirement to protect UK Government operations.
- 3.70 With these safeguards in place, we have re-considered this matter carefully and have decided to establish a maximum EIRP of 1 MW (60 dBW) for eLoran transmissions. We believe this higher power level will encourage investment and enable a wider range of eLoran services/uses to operate for the benefit of consumers and businesses.
- 3.71 On the question of using EIRP rather than 'Peak Radiated Power' we use both terms in the licence i.e. 'Maximum Peak Radiated Power (EIRP)' to make it clear that the maximum permitted peak radiated power takes into account the antenna gain with reference to an isotropic antenna, measured during the 'on' part of the transmission.
- 3.72 We consider this is an appropriate way to express the maximum peak radiated power level of eLoran transmissions from both the licence and regulatory perspectives.
- 3.73 We note the comments of RSGB about potential interference into nearby frequencies used by amateur radio. We do not consider the concerns of the RSGB to be significant enough to warrant further restriction on eLoran users. We have no reason to believe eLoran will be anything more than a niche market with a limited number of operators. Therefore, while a single eLoran system may have several transmitters distributed over a given geographical

area we do not consider there to be wide potential for multiple different overlapping eLoran system transmissions to cause significant aggregate levels of interference.

- 3.74 We also note that amateur radio is a secondary allocation⁵ across a much broader adjacent band and, as such, operates on the basis that it can expect no protection from other licensed users operating under their own authorisations and complying with appropriate licence conditions.
- 3.75 We acknowledge the important role the GLA has had in establishing international standards for eLoran services, and note its comments suggesting a licence condition requirement to define eLoran to an international standard e.g. adherence to a SAE 9990⁶. This signal standard is an amalgamation of elements including waveform detail, specifications, and explanations which make reference to ITU documents, and which can be applied to eLoran equipment.
- 3.76 Ofcom's general approach to spectrum authorisation is for technical neutrality i.e. so long as operators comply with licence conditions that ensure undue or harmful interference is not caused to other users they may use the spectrum they are assigned as per the licence terms.
- 3.77 Technical neutrality encourages innovation and investment and allows licensees to use the spectrum optimally. In the absence of clear evidence of spectrum management benefits, we believe operators are best placed to select the technologies and standards to use while meeting licence conditions. Accordingly, we have decided not to include a licence condition requiring adherence to any international standards.

Other Issues Raised

- 3.78 Some other issues were raised in consultation responses. These were mainly in respect to clarifications, and matters that respondents wanted us to take into account.

No-interference No-protection (NINP)

- 3.79 RethinkPNT sought clarification over the term 'No-interference No-protection (NINP)'. It said it recognised the phrase was widely used but said there was potential for confusion. It said one possible interpretation was that a licence holder might comply with the licence terms (i.e. cause 'no interference'), but interference would not be addressed by Ofcom if another licence holder caused interference (i.e. there was 'no protection').

Ofcom assessment

- 3.80 All licensees are required to comply with the conditions included in the licence. The eLoran licence includes conditions requiring that no interference is caused to other licensed users. We believe this is clear in the text of Schedule 1, section 2d of the licence, as set out at Annex 1. The conditions also require licensees to work with each other to ensure coexistence.

⁵ The Amateur Radio allocation in the 135.7-137.8 kHz band is a secondary service in both the UK FAT and International Radio Regulations.

⁶ The standard is not openly available and access to it for a single user requires payment of a fee: https://global.ihs.com/doc_detail.cfm?document_name=SAE%209990&item_s_key=00769488

- 3.81 Our general approach to the question of [interference to radio equipment](#) is set out on our website. This states that, although we cannot guarantee interference-free spectrum, there are clear circumstances where we may investigate and take any necessary action.

Short range devices

- 3.82 In comments also related to the issue of ‘No interference No protection’ John Shaw said there may be some ambiguity over coexistence with short range devices. He noted the definition used in EU spectrum policy and CEPT that “‘*short-range device*’ means a radio device which provides either unidirectional or bidirectional communication and which receives and/or transmits over a short distance at low power”.
- 3.83 He said this should be given greater emphasis and prominence and that the term ‘low power’ should be defined for the avoidance of doubt.

Ofcom assessment

- 3.84 The definitions and requirements for operation of short range devices in the UK are all set out in detail within the [Interface Requirements IR 2030](#). Additionally, we have published a summary of [short-range devices information](#) on our website.

Wireless Power transfer

- 3.85 McMurdo and John Shaw noted that licence-exempt wireless power transfer charging (WPT) operated across the 90-110 kHz band (and more widely) and may have the potential to produce “neighbourhood eLoran dead zones”.

Ofcom assessment

- 3.86 We note the comments about risks to eLoran from WPT applications. We also note that WPT has no corresponding frequency allocation status in the ITU Radio Regulations.
- 3.87 Nevertheless, [ECC report 289](#) investigated the impact of WPT systems for electrical vehicles operating within 79-90 kHz band on radio communications systems operating below 30 MHz. The report considers the impact of WPT operating in the 79-90 kHz band on adjacent band services.
- 3.88 While we note the emissions from WPT systems could potentially affect eLoran reception, but for this to happen the eLoran receiver would need to be in the near field. It is noted that interfering WPT signals will reduce rapidly with separation from any WPT charging point. Therefore, while interference *may* impact quality of service or reception this is only likely if the eLoran receiver is in very close proximity to an active WPT system e.g. within a few meters.

International co-ordination of GRIs

- 3.89 GLA said UK eLoran licensees should co-ordinate with organisations providing signals in the band that originate outside the UK, especially those that have the potential to interfere with, or suffer interference from, any UK eLoran transmission. It said this raised a wider question about the need for international co-ordination of the group repetition intervals (GRI) to limit interference over wider areas. It said its understanding was that there was no single point of contact to co-ordinate GRIs and this will need to be managed.
- 3.90 A confidential respondent [REDACTED] expressed a different perspective, saying additional transmitters located outside of the UK but providing usable signals over UK should

generally be seen as beneficial. It said there were no problems with cooperation and co-ordination.

Ofcom assessment

- 3.91 We note that wide use of eLoran technology is still in its infancy. For this reason, there is no current international forum for cross-border co-ordination. We note the comments of GLA and will take account of future international developments as necessary.
- 3.92 Nevertheless, Schedule 1(4) of our eLoran licence specifies that: *“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”*. We consider this condition to be suitable to address any issues that may arise.

Clear licensee information

- 3.93 RSGB said any publication of eLoran licences issued by Ofcom should carry clear licensee contact information, with licences available in downloadable extracts of the WT register (WTR). It said this was necessary to enable radio amateurs to liaise with licensees.

Ofcom assessment

- 3.94 As set out in our consultation (in paragraphs 3.10 & 3.33 - 3.34) licensees will be required to provide information about their planned operations as part of the licence application. A copy of the eLoran licences issued in the 90–110 kHz band will also be published on the Ofcom website, to ensure transparency and to help with the overall co-ordination of other eLoran systems operating in the band. High level details of the licensee’s identity will therefore be included as part of the licence.
- 3.95 We consider this to be sufficient information to help all spectrum users understand what licences have been issued along with the associated transmitter information.
- 3.96 We cover the adjacent band radio amateur use in sections 3.73 & 3.74 above and explain that no protection can be expected to this service and, in any case, if interference were to be received by other services, then Ofcom should be contacted through the normal route (as referenced in 3.99 below) rather than via the eLoran licensee directly.

Protection of eLoran

- 3.97 The GLA said that for eLoran to complement the maritime use of GNSS as a component of a resilient PNT solution, Ofcom should consider offering protection to the 90-110kHz band. It noted that GNSS is used to support maritime safety of life operations and any complementary solution would need to be relied upon in times of GNSS outage. Therefore, a level of protection should be considered.

Ofcom assessment

- 3.98 All eLoran licences that are issued will be subject to the same conditions i.e. licensees will be required, as a licence condition, to co-operate and co-ordinate with other licensees (if necessary adjusting transmission power and other technical parameters) to enable the different systems to coexist and not cause undue interference to each other.
- 3.99 In addition, should interference occur from a non-licensed transmitter, this would be dealt with via our normal interference management procedures detailed here: [Interference to radio equipment - Ofcom](#).

3.100 We believe these measures are sufficient to allow multiple eLoran systems to coexist and at the same time provide the necessary safeguards should interference occur.

4. Summary of decisions and next steps

- 4.1 We have decided to create a new licence product authorising use of the 90-110 kHz spectrum band for eLoran services. The licence template we will use, and issue is attached at Annex 1 of this statement. The licence includes the non-technical and technical conditions we will apply.
- 4.2 We have decided to make two main changes to the conditions set out in the draft licence attached to the May 23 consultation. These concern the notice period for revocation of the licence on spectrum management grounds (increased to 5 years); and the maximum peak radiated power (EIRP) that may be transmitted from any single transmitter (increased to 60 dBW). In addition to these two main changes, we have also simplified Schedule 2 of the licence.
- 4.3 The purpose of Schedule 2 is to capture the specific location(s) and peak radiated power(s) of the individual transmitters authorised by the licence, to facilitate transparency and aid wider planning with other eLoran licensees/systems. The additional information we included in our consultation, while still relevant for the individual licensee's transmission system design, is not necessary to achieve the objective of this licence schedule, so has been removed.
- 4.4 This simplified approach also allows greater flexibility for the licensee to specify the peak transmitter power (EIRP) for each base station and then select the most appropriate combination of antenna gain and transmitter power for their requirements and transmitter configuration.
- 4.5 All other conditions remain the same as proposed in the consultation⁷ and eLoran licences issued by Ofcom for the 90–110 kHz band will be published in full on the Ofcom website.
- 4.6 The new licence will be subject to a fee, payable every year, based on the costs associated with Ofcom's administration of the licensing process. We have set the fee for the eLoran licence at £200 per year, based on our cost-recovery.
- 4.7 We now invite stakeholders wishing to obtain a licence to submit an application form. [Details of how to apply](#) are set out on our website.

⁷ Editorial changes have also been made to the Schedule 1 section 3 title to better clarify the purpose of the section and the Maximum Peak Radiated Power (EIRP) in the table has been expressed in dBW only.

A1 Sample Enhanced Long-Range Navigation (eLoran) Licence

Office of Communications (Ofcom)



Wireless Telegraphy Act 2006

Enhanced Long-Range Navigation (eLoran) licence

Licence no: **xxxxxxx**
Date of issue: **xx xxxx 20xx**
Fee payment date **xx xxxx (annually)**

1. The Office of Communications (Ofcom) grants this wireless telegraphy licence ("the Licence") to **xxxxxxxxxx**
(Company registration number xxxxxxxx)
("the Licensee")
xxxxxxxxxx
xxxxxxxxxx
xxx

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 Act⁸;
 - (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 Act⁹.

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

⁸ These are regulations on spectrum trading.

⁹ See Ofcom's website for the latest position on spectrum trading and the types of trade which are permitted.

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.
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

SCHEDULE 1 TO LICENCE NUMBER: **xxxxxxx**

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	<p>99% or more of the total radiated power must be contained within the 90 - 110 kHz band.</p> <p>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.</p>
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.

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SCHEDULE 2 TO LICENCE NUMBER: xxxxxxxx

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

Base station locations

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

Station 1	
Name / Address of Transmitter Station Site	
Transmitter Station Location (NGR)	
Peak Radiated Power, EIRP (dBW)	

[Repeat table for subsequent sites etc]

SCHEDULE 3 TO LICENCE NUMBER: **xxxxxxx**

EMF Licence Condition

Schedule Date: **xx xxxx 202x**

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 restrictions¹⁰ in the relevant tables for general public exposure identified in the ICNIRP Guidelines¹¹ 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 restrictions¹² in the relevant tables for general public exposure identified in the ICNIRP Guidelines¹³ in any area where a member of the

¹⁰ Compliance with the reference levels for general public exposure identified in the ICNIRP Guidelines will ensure compliance with the basic restrictions.

¹¹ The relevant tables for general public exposure are identified in Ofcom's "Guidance on EMF Compliance and Enforcement".

¹² Compliance with the reference levels for general public exposure identified in the ICNIRP Guidelines will ensure compliance with the basic restrictions.

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

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 an emergency situation (in the vicinity of that situation) including for search and rescue activities and maritime emergency communications¹⁴.

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

¹⁴ Further information on emergency situations is set out in Ofcom's "Guidance on EMF Compliance and Enforcement".

their trade, business or profession or the performance by them of a public function;¹⁵

- (e) **“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.¹⁶
- (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.¹⁷
- (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

¹⁵ 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](#).

¹⁶ 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: <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.

¹⁷ 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”.

- transmit at a combined total radiated power in any particular direction¹⁸ that is higher than 100 Watts EIRP or 61 Watts ERP;¹⁹
- 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;²⁰
 - 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
- (l) **“wireless telegraphy station”** has the meaning given to it in section 117 of the Wireless Telegraphy Act 2006.

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¹⁸ 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.

¹⁹ 100 Watts EIRP is equivalent to 61 Watts ERP.

²⁰ The relevant tables for general public exposure are identified in Ofcom's "Guidance on EMF Compliance and Enforcement".

A2 Legal background

Ofcom's duties

A2.1 Ofcom's statutory powers and duties in relation to spectrum management are set out primarily in the Communications Act 2003 (the "**2003 Act**") and the Wireless Telegraphy Act ("**WT Act**").

Communications Act 2003

A2.2 Our principal duties under the 2003 Act are to further the interests of citizens and consumers in respect to communications matters, where appropriate by promoting competition. In doing so, we are also required (among other things) to secure the optimal use of spectrum and the availability throughout the United Kingdom of a wide range of electronic communications services.

A2.3 Our spectrum management duties require us to have regard to:

- (i) the desirability of promoting competition in relevant markets;
- (ii) the desirability of encouraging investment and innovation in relevant markets;
- (iii) the different needs and interests, so far as the use of the electromagnetic spectrum for wireless telegraphy is concerned, of all persons who may wish to make use of it; and
- (iv) the different interests of persons in the different parts of the United Kingdom, of the different ethnic communities within the United Kingdom and of persons living in rural and in urban areas.

Wireless Telegraphy Act

A2.4 We permit the use of the radio spectrum by granting wireless telegraphy licences under the WT Act. It is unlawful and an offence to install or use wireless telegraphy apparatus without holding a licence granted by Ofcom, unless the use of such equipment is exempted.

A2.5 In carrying out our spectrum functions we have a duty under section 3 of the Act to have regard in particular to:

- (i) the extent to which the spectrum is available for use, or further use, for wireless telegraphy;
- (ii) the demand for use of that spectrum for wireless telegraphy; and
- (iii) the demand that is likely to arise in future for such use.

A2.6 We also have a duty to have regard to the desirability of promoting:

- (i) the efficient management and use of the spectrum for wireless telegraphy;
- (ii) the economic and other benefits that may arise from the use of wireless telegraphy;
- (iii) the development of innovative services; and

(iv) competition in the provision of electronic communications services.

A2.7 Section 8(3B) of the WT Act says the terms, provisions and limitations specified in the licences must be:

- objectively justifiable in relation to the wireless telegraphy stations or wireless telegraphy apparatus to which they relate;
- not such as to discriminate unduly against particular persons or against a particular description of persons;
- proportionate to what they are intended to achieve; and
- transparent in relation to what they are intended to achieve.

Licensing of eLoran

A2.8 As noted above, Ofcom is responsible for authorising the use of radio spectrum in the UK, including through the issue of licences. However, the WT Act requires us to exempt stations and apparatus from the requirement to be licensed unless particular circumstances mean it is necessary²¹.

A2.9 Such circumstances may include the need to ensure there is no undue interference with wireless telegraphy; ensure there is no adverse effect on the technical quality of services; and no inefficient use of the part of the electromagnetic spectrum available for wireless telegraphy.

A2.10 In the case of eLoran services, we consider licensing to be necessary in order to apply appropriate conditions to allow a number of users to access the spectrum at the same time.

A2.11 Licensing enables us to ensure that an operator is aware of the conditions and obligations placed on it regarding the use of radio equipment, and helps us manage the overall risk of interference to other users. This is especially important when we impose restrictions, such as power limits or other requirements, such as obligations to co-ordinate with other authorised spectrum users in the UK or overseas. Authorisation via licence makes such conditions clear, as well as what frequencies can be used and who is ultimately responsible for use of the spectrum.

A2.12 Licensing also makes it more straightforward for us to take swift and direct enforcement action in the case of suspected non-compliance, or change authorisation terms if needed. Our powers of inspection, restriction and closedown are out in our [General Licence Conditions](#) booklet.

A2.13 We consider the decisions set out in this statement to be:

- **objectively justified** in that they are likely to help meet anticipated increased future demand for access to this spectrum, noting the propagation characteristics, international developments, potential demand for more resilient PNT solutions, and bandwidths available in this band;
- **not unduly discriminatory** against particular persons or against a particular description of persons in that they apply to all potential new users of the spectrum wishing to deploy this kind of system;

²¹ Section 8(3) and 8(4) of the [WT Act](#),

- **proportionate to what they are intended to achieve**, in that our proposed licence conditions aim to ensure that new users of the bands would not be likely to cause undue interference to others; and
- **transparent in relation to what they are intended to achieve**, in that they are clearly described and explained in this consultation document.

Impact assessment

- A2.14 Impact assessments provide a valuable way of assessing different options for regulation. They form part of best practice policy making. This document as a whole represents an impact assessment as defined in section 7 of the Communications Act 2003.
- A2.15 In preparing this document, we have considered the citizen and consumer interests relating to authorising equipment. We have also considered the impact of granting the proposed licence on other users of the radio spectrum.
- A2.16 In summary, we consider there are potentially beneficial impacts for UK consumers and businesses that could arise from making eLoran services available. As noted earlier in this document, PNT services are important for people and businesses in the UK to provide precise positioning information for key industry sectors; to help navigation in cars, planes and ships; and to provide highly accurate timing for modern communications networks, broadcasting and financial services.
- A2.17 eLoran can help provide resilience and back-up to satellite-based PNT receivers, which are susceptible to interference, and vulnerable to space weather events. Resilience is particularly important for UK critical PNT infrastructure.
- A2.18 We do not believe there are likely to be any negative impacts, given the proposed technical and non-technical licence conditions.

Equality impact assessment

- A2.19 Ofcom is separately required by statute to assess the potential impact of all our functions, policies, projects and practices on the following equality groups: age, disability, gender, gender reassignment, pregnancy and maternity, race, religion or belief, and sexual orientation.
- A2.20 Equality impact assessments also assist us in making sure that we are meeting our principal duty of furthering the interests of citizens and consumers regardless of their background or identity.
- A2.21 We consider that our proposals would not be detrimental to any of these equality groups or impact any of these groups in any different way to others.
- A2.22 We have not carried out separate equality impact assessments in relation to the additional equality groups in Northern Ireland: religious belief, political opinion and dependants. This is because we anticipate that our proposals would not have a differential impact in Northern Ireland compared to consumers in general. We welcome any stakeholder views on this assessment.