Enabling drone innovation and security

Additional frequency bands for drone control and drone detection radar

Consultation and call for input

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Annex

1. Overview

1.1 Drones have significant potential to drive innovation and economic growth, with rapid technological developments enabling new services across sectors including infrastructure, logistics, emergency response, and public safety.

1.2 We already authorise several spectrum bands for drone control and safety, including for flights beyond visual line of sight (BVLOS). As use cases continue to develop, demand for additional spectrum is emerging. For example, BVLOS use cases often rely on mobile networks for primary command and control but may also require back-up spectrum access where there are gaps in mobile coverage.

1.3 We are keen to enable further innovation to take place in the UK in the near term. The sector is developing fast, with uncertainty over which specific spectrum solutions will be most important in the UK, and when. Accordingly, we are proposing to enable drone access to two additional bands **on a time-limited basis**, to enable companies to develop, launch and expand commercial deployments; and benefit consumers and citizens in the near term, while we plan for longer term solutions.

1.4 In parallel, the growing capability of drones is also creating new risks around safety and security. We are proposing a new licence to authorise the use of drone detection radars in the UK.

What we are proposing – in brief

We are making proposals to:

1. **Enable 450 MHz to be used for drone control links with three year fixed term licences,** using frequencies between 453–462.5 MHz shared with business radio. This band is primarily available in remote and rural areas;
2. **Enable drone control links to access a portion of the 5030–5091 MHz band** (our preferred option is 5040–5060 MHz) until 2032, with good availability across the UK;
3. **Create a new drone radar licence** to authorise drone detection radar at 24 GHz (24.05-24.25 GHz) and 16 GHz (15.4 GHz- 16.6 GHz). The 16 GHz authorisation would require case by case coordination with the Ministry of Defence.

We are also seeking stakeholder inputs on future spectrum needs relating to drones, including for drone control, safety and detection.

1.5 We plan to follow up these interim authorisations for drone control with longer term proposals. We aim to review the 450 MHz approach within three years of the first licences issued. At present there is currently limited availability in and around many urban areas. We also plan to transition our approach to the 5030-5091 MHz band to align the details with globally harmonised standards when those standards are agreed. We anticipate standardisation for 5030-5091 MHz should be in place well before 2032. Our proposed timing will allow for a transition period.

1.6 Our approach will give drone operators access to additional spectrum as soon as practicable, supporting innovation in the near term. At the same time, it will support efficient spectrum management by enabling Ofcom to review our approach in light of

commercial and regulatory developments before we determine appropriate longer-term allocations.

1.7 To help inform our future plans we are also seeking wider feedback on future spectrum demand for drone control, safety and drone detection. We welcome comments on all aspects of this document.

Next steps

1.8 We now invite stakeholders to comment on the proposals in this consultation. The consultation will remain open until 30 September 2026.

1.9 Once the consultation is closed, we will review all the responses we receive. We then plan to publish a statement in early 2027 setting out our decisions on whether to proceed with our proposals.

1.10 If we decide to proceed with our proposals on the 450 MHz and 5030-5091 MHz bands, we plan to publish a further consultation on the draft licences.

1.11 We understand that, due to the pace of innovation in this sector, there may be cases where operators seek to access spectrum for drone detection radar or drone control links before we finalise our decisions. We are open to considering ad hoc licensing requests during this period (as discussed in Section 8).

1.12 The overview section in this document is a simplified high-level summary only. The proposals we are consulting on, and our reasoning are set out in the full document.

2. Introduction and background

2.1 Drones, also known as unmanned aircraft systems (UAS), are aerial vehicles that do not carry a human operator but instead are remotely piloted or autonomous.[1] There is a wide and growing range of models aimed at consumer, professional or defence markets. All depend on spectrum for crucial functions including wireless control and flight safety.

2.2 There is growing consensus that this sector is evolving rapidly and can promote growth and innovation in the UK. HM Treasury has highlighted UAS as an area where streamlined regulation can unlock growth; a PwC study carried out for the Department for Transport and the Department for Business, Energy and Industrial Strategy (BEIS) estimated drones could contribute £45 billion to the UK economy by 2030.[2]

2.3 In recent years, there have been widespread reports of large investments in drone technology, often driven by defence. In May 2026 the UK Government announced a £50 million investment in the drone and advanced air mobility sector, such as drone deliveries and flying taxis.[3]

UK regulatory framework

2.4 The pace of industry growth in the UK also depends on regulations to ensure physical safety of drone operations, especially for long distance flights. The UK's Civil Aviation Authority (CAA) is responsible for regulating drone use and sets rules for how and under what conditions they may operate. It already allows drones to fly BVLOS in some scenarios in controlled air space. The CAA is planning to liberalise BVLOS regulation over the next few years, permitting drones to gradually integrate into UK airspace, and allowing for commercial scaling.[4]

2.5 As the spectrum regulator in the UK, Ofcom authorises the radiocommunications equipment that can be used on a drone unit. We have already authorised drones to operate in the following ways in the UK:

- shorter-range flights using low power may operate on a licence exempt basis in 2.4 GHz and 5 GHz (most drones on the market currently fall under this licence exempt regime);
- since early 2023, following our 2022 UAS statement, BVLOS drone operations may operate under a UAS operator radio licence in various mobile and satellite bands (as described in our UAS guidance); and
- in March 2025 we extended the UAS licence to authorise the 978 MHz band for safety devices on drones, universal access transceivers (UAT) which make other aircraft aware of a drone's position.[5]

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[1] We use the term "drone" throughout this document to refer to "unmanned aircraft systems" (UAS) and "remotely piloted aerial systems" (RPAS). There are other types of drones (e.g. maritime drones), but for this document, we use this term to refer to aerial drones.

[2] New approach to ensure regulators and regulation support growth – *GOV.UK*; Skies without limits v2.0 - *PwC.*

[3] Nearly £50 million government backing to power up drone and flying taxi tech – *GOV.UK*

[4] See "Future of Flight: BVLOS Roadmap," CAP3182*,* October 2025, *CAA*

[5] Ofcom/CAA Joint Statement. The extra frequencies are required for some important applications, for example, enabling innovation and efficiency in managing critical infrastructure.

2.6 In recent years we have also received an increasing number of "innovation and trial licence" applications from stakeholders, who wish to test various kinds of new technologies and ideas involving drones. We issue these licences on a non-permanent, non-commercial basis, to enable opportunities for research and to develop and test innovative wireless technologies.

Innovation driving demand

2.7 Advancements in drone technology are broadening the capabilities and applications of drones across a wide range of industries. Some of these emerging uses may require drones to operate over longer distances and at higher altitudes. To accommodate these developments safely and at scale, increased access to spectrum will be required.

2.8 Some examples of innovative drone use cases include:

- **Medicine:** delivering medical supplies including blood, samples, vaccines, and donor organs for transplant. NHS Scotland used drones to transport laboratory test samples between two different regional health boards[6], while a similar trial was run for Guy's and St Thomas' NHS Foundation Trust, in partnership with Apian and Wing, in London.[7]
- **Farming**: monitoring crop and soil health, crop planning, spraying and dispensing fertiliser and seeds. The number of agricultural drones in the UK could be in the hundreds according to one estimate.[8]
- **Logistics and deliveries:** enabling last-mile delivery of packages, food, and essential supplies. Drones can reach remote communities more easily, operate with lower emissions and help reduce road traffic congestion. The UK's first drone delivery system was announced in 2023 and was extended in 2024 until at least 2026, operating between Orkney and the islands of Graemsay and Hoy.[9] Amazon launched drone deliveries in Darlington in 2026.[10]
- **Infrastructure inspection**: monitoring and inspecting utilities and other core infrastructure for operational problems such as faults or leaks.[11] Real-time video and sensor data from the drone can be streamed to engineers, enabling faster detection of problems, while reducing the costs of deploying staff, and potentially better managing risks. Both National Grid and Network Rail announced programmes to deploy drones to inspect their infrastructure.[12]
- **Public safety and law enforcement:** conducting aerial surveillance, crowd monitoring, aiding search and rescue and reconstruction of traffic accidents. In June 2026, London's Metropolitan Police announced a further rollout of drones stationed on select police buildings to respond to 999 emergency calls, after an initial trial.[13]

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[6] Medical drone delivery trials revolutionising the skies in Scotland – *GOV.UK*
[7] NHS delivery drones take flight offering faster and greener patient care – *Guy's and St Thomas' NHS Foundation Trust*
[8] Why drones could be the future of farming – *BBC News*
[9] UK's first drone mail service extended in Orkney – *BBC News*
[10] Amazon has started drone flights in the UK—here is everything you need to know - *Amazon.*
[11] Uses include power lines, wind turbines, solar panels, pipelines, reservoir levels and along railway tracks.
[12] Powering the future: National Grid rolls out centralised autonomous drone inspections across network – *National Grid;* Network Rail rolls out remotely operated drones to monitor and protect railways - *Network Rail*
[13] Met to announce ambitious plans to scale drones, LFR and AI in fight against criminals – *METROPOLITAN POLICE*; Drones deployed to help Met Police's 999 response – *BBC News*

2.9 As the use of drones increases there is also growing potential for malicious use. For example, in 2018 drone sightings near Gatwick airport resulted in more than 1000 flight cancellations over several days, and incidents continue to be reported, more recently at Heathrow.[14]

2.10 To counter this type of malicious use, there is rising demand for spectrum access to deploy drone detection radars to protect critical national infrastructure and aid law enforcement.

Legal duties and scope of proposals

2.11 In the UK, Ofcom manages the radio spectrum under two Acts of Parliament: the Communications Act 2003 (the 2003 Act) and the Wireless Telegraphy Act 2006 (the WT Act). We are responsible for authorising access to spectrum and setting and enforcing the rules by which people can transmit using radio equipment, and have a duty, set out in the relevant Acts, to ensure efficient use of spectrum.

2.12 The WT Act does not bind the Crown, so Crown bodies do not need authorisation or a licence from us to install or use radio equipment where Crown immunity applies.

2.13 The public sector is a major user of spectrum for a variety of services and applications. These include defence applications, the emergency services, UK space activities, weather, and climate science, among others. The majority of Crown spectrum use is for defence.

2.14 Some wider public sector uses do not access spectrum under Crown immunity, and we license them directly (e.g. police and fire services). This may be because the relevant applications align more closely with civil use cases, making it more practical to manage them through our licensing regime rather than Crown use.[15]

2.15 The proposals described in Section 6 of this document are limited to authorising drone detection radar systems and do not include authorisation of active counter-drone measures such as jamming or other electronic effectors. We have no power under the WT Act to authorise the operational deployment of jamming equipment and nothing in this document should be interpreted as permitting such activity.

2.16 Certain law enforcement, security, intelligence and defence bodies may exercise counter-drone or radio interference capabilities under separate statutory powers, Crown authorities or specific legislative frameworks. Any such powers operate independently of our spectrum authorisation functions and are outside the scope of these proposals. This document neither creates nor modifies those powers.

2.17 Further details about our legal framework can be found at Annex 2.

Impact assessments

2.18 As a matter of policy, we are committed to carrying out and publishing impact assessments in relation to our policy proposals and decisions, although the form of that assessment will depend on the particular nature of our proposals. We also carry out an equality impact

[14] Gatwick Airport: Drones ground flights - *BBC News*; Suspected drones cause disruption at Heathrow airport with flights delayed -*The Independent*

[15] See Public sector spectrum framework - *GOV.UK*

assessment and Welsh language impact assessment. Our impact assessments for the proposals in this document are set out in Annex 1.

Question 1: Do you have any comments on our impact assessments as set out in Annex 1? Please specify whether your comments relate to:

- our wider impact assessment;
- our equality impact assessment; or
- our Welsh language impact assessment.

Structure of this document

2.19 In the rest of this consultation document:

- Section 3 outlines our high-level rationale for additional spectrum for use by drones.
- Section 4 describes our proposals for enabling interim access to 450 MHz for drone control.
- Section 5 explains our proposals for enabling interim access to 5030-5091 MHz for drone control.
- Section 6 outlines our proposals for authorising drone detection radar.
- Section 7 sets out further questions where we are seeking stakeholder input, relating to future demand for spectrum for drone control, safety and drone detection radar.
- Section 8 outlines our next steps.
- Annex 1 sets out our impact assessments including on equality and the Welsh language.
- Annex 2 describes our legal framework.
- Annexes 3 and 4 explains our coexistence analysis for drone control links in the 450 MHz band, and our spectrum availability analysis for the 450 MHz band, respectively.
- Annex 5 sets out our coexistence analysis for drone control links in 5030-5091 MHz.
- Annex 6 describes our coexistence analysis for drone detection radars in 24 GHz.
- Annex 7 outlines the satellite frequencies authorised in the UAS licence.
- Annexes 8-11 relate to our consultation principles, how stakeholders can respond and the consultation questions we are asking.
- Annex 12 contains a draft of our proposed drone detection radar licence.

3. Identifying additional spectrum for drone control

3.1 We want to ensure our spectrum authorisation framework for drones evolves in pace with innovation in the sector. In this section we set out our current assessment of where near term demand for additional spectrum for drone control may arise. We explain why we have identified 450 MHz and 5030-5091 MHz as bands with potential for near term drone use, given our assessment of demand, spectrum availability, and equipment. Our proposals to enable time-limited (interim) access to these bands are set out in Sections 4 and 5.

3.2 We seek views on long-term demand for additional spectrum for drone control in Section 7.

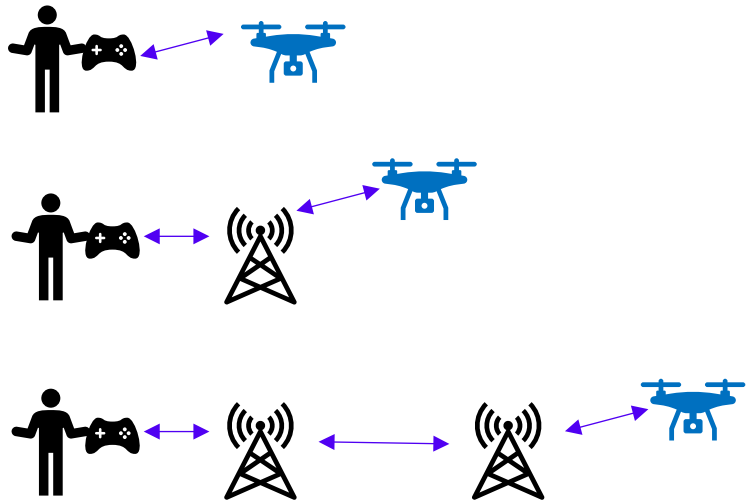
Command and control links – demand for additional spectrum

3.3 Command and control links (also known as C2 or "control links") connect a drone with the drone's pilot and convey input information which:

- ensures that the drone carries out the pilot's operating instructions, including the drone's direction, height, and speed for flight; and
- relays information from the drone back to the pilot, about its GPS position, or a video feed of its surroundings.

3.4 This relationship is illustrated in figure 3.1. For example, a pilot might operate a drone to deliver post, food, or medical supplies to a location a significant distance away from their command position, while the drone transmits footage of making the delivery.

Figure 3.1: Control links connect a drone to its pilot either directly or via base station or network



3.5 We currently authorise several bands for control links covering a wide range of use cases, either under our general UAS licence[16] or licence exemption, as summarised in table 3.1.

Table 3.1: Current spectrum bands for drone control links

Band	What is it good for?	Limitations
Mobile bands	Long range / BVLOS	Vulnerable to "mobile not spots"; dependency on mobile operator agreement; limited height range.[17]
2.4 GHz, 5 GHz licence exempt	Short range	Not good for longer range flights; spectrum is shared with many other devices
Satellite	Extensive coverage	Depends on operator agreement; concerns about latency, performance in heavy rain and cost of equipment

3.6 Due to existing limitations, we are seeing growing demand from the industry to complement these existing bands with additional spectrum that can enable an even wider range of use cases. Some of the demand is for secondary links that can work in tandem with these existing bands, for example becoming active when a drone passes through an area without mobile coverage ("mobile not spots"). This demand can be prompted by drone operators' own design, or by regulation. For example, the CAA's proposals on control links show that secondary links are likely to be required in a range of use cases.[18]

3.7 We are therefore proposing to enable near-term access to additional spectrum for drone control links in the 450 MHz (various frequencies between 453-462.5 MHz) and 5030-5091 MHz bands, given the existing equipment ecosystem in the international market, international harmonisation potential, initial demand indications and compatibility with incumbent uses in the UK. Ecosystem availability allows innovators to launch initial services quickly in both bands.

3.8 These bands also complement each other and our existing UAS licence, as table 3.2 shows:

- 450 MHz is well suited for rural and remote areas due to propagation characteristics which support resilience and longer range, but there is poor availability in most urban areas given other existing spectrum users. In contrast, 5030-5091 MHz has excellent availability nationwide but shorter range.
- Both bands can provide coverage in "mobile not spots" (e.g. by providing a backup or secondary link), and neither requires authorisation from a mobile or satellite operator, and they do not have the same issues as satellite control (e.g. concerns about latency, rain fade, cost, power, and weight).

[16] For a complete list of the frequencies we authorise, see our UAS Statement.
[17] CAA's current proposal is to limit use of mobile networks to a maximum of 400 feet – C2 Link policy concept for SAIL 1 to 3 consultation, p. 15, CAP3154 – *CAA*
[18] C2 Link policy concept for SAIL 1 to 3 consultation, p. 11 - *CAA*

Table 3.2: Summary of proposed new spectrum bands for drone control links

Band	What is it good for?	Limitations	How much spectrum? (proposed)
450 MHz band	Longer range / rural areas / heavy rain conditions / no existing mobile coverage	Availability will vary from place to place, given sharing with incumbent users. Best availability in rural and remote areas.	Various 12.5 kHz channels in the 453-462.5 MHz range
5030- 5091 MHz band	Dedicated aeronautical band with good availability. Good for dense urban locations where other bands may be congested	Timing of international harmonisation is still to be confirmed, propagation not as good as 450 MHz	20 MHz at first (aligned with US); up to 61 MHz eventually

Question 2: Do you agree with our assessment of the 450 MHz and 5030-5091 MHz bands for drone control links? Do you agree there is demand for these bands in the UK (please identify any relevant use cases and locations in your response)? Are there any other frequency bands we should consider for control links?

Rationale for time-limited approach

3.9 In general, we prefer to provide as much certainty as possible to stakeholders when authorising access to new spectrum. In this case, because it is a nascent industry with rapidly evolving needs, we consider it is preferable to enable earlier access to spectrum on an interim or time-limited basis rather than delay our proposals (and subsequent decisions if we decide to proceed) while developing greater certainty over the most suitable long-term solution. We will consider the longer-term options in future reviews, as discussed in Sections 4 and 5.

4. Enabling interim drone use of the 450 MHz band

4.1 In this section, we present our proposals to enable drone use in the business radio portion of the band between 453-462.5 MHz (as shown in figure 4.1)[19] and the conditions for sharing with other users. Availability is primarily in remote and rural areas, owing to existing business radio usage.

4.2 We are proposing a short term (three year) 450 MHz drone licence. We plan to review our authorisation approach within three years of the first licences being issued under this framework to provide clarity to industry on whether longer term use of the band will be feasible, in part or all of the UK.

Why we are proposing this band

4.3 The advantages of the 450 MHz band for drones are its good range and propagation characteristics, covering longer distances and performing well in poor weather conditions such as heavy rain or fog. An ecosystem for drone equipment in this band is also developing in the US[20], which has been designed to meet existing business radio planning thresholds.

4.4 Drone control links can operate in 12.5 kHz (or sometimes 25 kHz) narrowband channels. Since the equipment drones use in the 450 MHz band has been modified from existing business radio equipment, they can operate within business radio channels in the UK's existing 450 MHz band plan.[21] Importantly, drone equipment in the 450 MHz band can be frequency flexible and tuneable across the 450-470 MHz range, so it adapts well to sharing spectrum. Overall, we consider this indicates drones can coexist with other narrowband users of the 450 MHz band in the UK where spectrum is available.

4.5 However, this band is not currently suitable for nationwide drone services, in particular owing to existing business radio use which means that availability is constrained in some parts of the UK, especially urbanised areas and much of England. There is good spectrum availability for drones in the Nations and rural areas, which could support many important drone uses cases – for example, search and rescue, delivery of post and medicine in remote areas, and farming (see Section 2).

4.6 While the 450 MHz band is widely used, the number of coordinated business radio licences in this band is slowly declining (as discussed in paragraphs 4.15-4.16). We consider that this creates an opportunity for new users to access spectrum for drone control links.

[19] The specific blocks of frequencies between 453-462.5 MHz we could potentially authorise for drone control are: i) 453.025-454.9625, ii) 455.5-455.825, iii) 456.025-456.975, iv) 459.56875-460.475, v) 460.775-461.20625, and vi) 461.28125-462.475 MHz.

[20] This follows the Federal Communications Commission's (FCC) 2025 proposed rules to permit drone control links in this band in the US (see FCC 25-7).

[21] Permitted channel bandwidths within 450 MHz in the UK are 6.25 kHz, 12.5 kHz, 25 kHz and 50 kHz.

Current use of the 450 MHz band

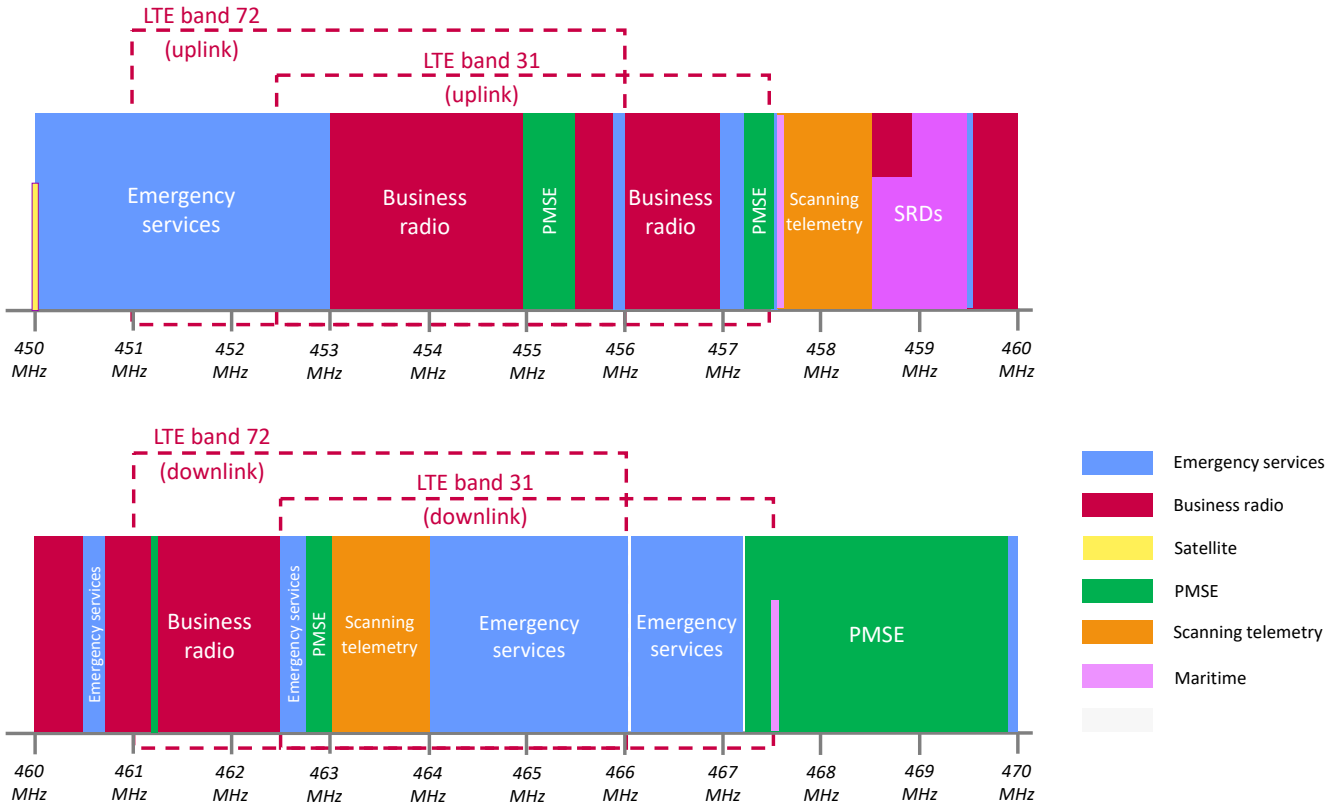
4.7 The 450 MHz band is predominantly used by narrowband systems in the UK. It is used intensively across many different users as shown in figure 4.1 - business radio, PMSE, emergency services, scanning telemetry, licence exempt short range devices (SRDs), maritime onboard ships, and satellite (earth to space) use by the space operation service and space research service.

4.8 **Business radio:** various blocks between 453-462.5 MHz (as summarised in footnote 19 and shown in red in figure 4.1) support private mobile radio (PMR) communications across many industries including retail (shopping precincts), transport (buses and taxis), security, factories, construction, and utilities.

4.9 **Programme making and special events (PMSE):** used for talkback (represents over 90% of PMSE use in 450 MHz), with light use of occasional audio and telemetry links.[22]

4.10 **Emergency services:** police, fire and rescue services, and HM Prison Service use of dedicated frequencies in the 450 MHz band, UK wide.[23] Some emergency services allocated blocks permit short term business radio and PMSE use under contract.

Figure 4.1: Current use of the 450 MHz band in the UK



[22] These uses are set out in UK Interface requirements 2038 – PMSE (see tables 3.2, 3.3 and 3.5).
[23] See page 2 of the emergency services frequency allocation table for a list of frequencies used.

4.11 Other users within the 450 MHz band are:

- **Scanning telemetry** uses 457.5-458.5 MHz (paired with 463-464 MHz) for monitoring and controlling safety critical utilities equipment.
- **Licence exempt short range devices (SRDs)** use 458.5-459.5 MHz for applications including telemetry, model control, alarms, and medical applications.[24] Self-coordinated business radio users (see paragraph 4.15) share 458.5-459 MHz; under our proposals this would not be available for drone use.
- **Maritime** use of 457.5-457.6 MHz paired with 467.5-467.6 MHz relates to an international allocation for on board ship communications.[25]

4.12 Other users adjacent to the 450 MHz band (above and below 450-470 MHz) are:

- **Satellite** use of 449.75-450.25 MHz is an international allocation supporting space services which have a small number of earth stations in use (transmission only).[26]
- **MOD (Fylingdales radar)** operates in the frequencies below at 420-450 MHz.
- **Digital terrestrial television (DTT)** operates in the frequencies above at 470-694 MHz, using a mixed network of high power and smaller in-fill transmitters. These frequencies are also available to PMSE licensees for wireless microphones and similar uses.

Licensing trends

4.13 As the 450 MHz band has been heavily used in the UK, we have considered recent licensing trends for co-channel use (i.e. business radio) and PMSE which operates in immediately adjacent channels.[27]

4.14 We have observed a decline in some licence types as outlined below, which leads us to believe that in parts of the UK, it would be possible to introduce drones as a new user to this band, subject to sufficient spectrum being available in the relevant location.

Business radio

4.15 Over 39,000 licences are authorised in the 450 MHz band, across five licence types[28]:

- Ofcom coordinated licences – i) **business radio technically assigned**, which authorise a particular channel within a stated coverage area; and ii) **business radio area defined**, which authorise exclusive use of a frequency within a defined area (from 50 km x 50 km to UK wide); and
- self-coordinated "light" licences – iii) **business radio simple UK**, for device-to-device communications without using a base station (authorises several frequencies); iv) **business radio simple site**, for localised voice and paging systems for small/specific sites using base station and antenna; and v) **business radio suppliers**, used only for hire, service and repair of radio equipment.

[24] These are outlined in UK Interface requirements 2030 (licence exempt SRDs) – *Ofcom.*
[25] UK Interface requirement 2035 – for maritime UHF onboard communication systems and equipment. It is allocated under footnote 5.287 of the ITU Radio Regulations.
[26] Footnote 5.286 of the ITU Radio Regulations states it may be used for space operation services (Earth-to-space) and space research services (Earth-to-space), subject to agreement obtained under provision No. 9.21.
[27] We do not generally manage emergency services assignments, so licensing trends have not been considered.
[28] The breakdown of business radio licences in April 2026 from a total of 39,290 licences was: (i) 13,005 technically assigned; (ii) 122 area defined; (iii) 15,638 simple UK; (iv) 9305 simple site; and (v) 1220 suppliers.

4.16 Compared to the business radio licensing figures published in our 2023 Call for input: Potential spectrum bands to support utilities sector transformation, this shows a slow decline since early 2023. This decline is higher for coordinated licences: 1.57% decrease for technically assigned, and 6.87% decrease for area defined licences (though some light licence types have increased slightly).[29]

PMSE

4.17 We recognised 450 MHz as strategically important for PMSE in our 2015 PMSE review.

4.18 Figure 3.1 of our 2026 Call for input for the PMSE Sector Spectrum Review shows we made nearly 40,000 PMSE assignment allocations in the 450 MHz band in 2024. More recent analysis shows there were nearly 42,000 PMSE assignments allocations in 2025. While this shows some fluctuation, overall, this is a reduction of over 5000 assignment allocations since 2022, and a c.11% decrease since 2018.[30]

Coordinating drones with other band users

4.19 The harmonised technical conditions for broadband and narrowband use of 450-470 MHz band were agreed in ECC Decision (19)02. The band is identified for International Mobile Telecommunications (IMT), supporting an increasing amount of LTE-based equipment. The band is also used for NB-IoT and LPWAN type equipment.[31] Although the UK (and some other European countries) continue to use the 450-470 MHz band for narrowband services, elsewhere in Europe use is moving to wider bandwidths. There are not yet any harmonised technical conditions for drones using the 450-470 MHz band.

4.20 Any new drone use would need to be coordinated with other 450 MHz band users. Drones pose a greater coordination challenge than typical business radio use given they operate at higher altitudes and with greater mobility. This adds complexity to the coexistence environment that we would need to manage through appropriate licence conditions.

4.21 We carried out coexistence analysis to assess whether our existing coordination approach for business radio users (set out in the Business radio technical frequency assignment criteria (TFAC) and Interface Requirement 2044) would need to be adapted to ensure drones sufficiently protect other 450 MHz band users. We assessed other users as follows:

- co-channel business radio users, given they will share the same frequencies;
- co-channel drone users;
- adjacent channel business radio users operating between 453-462.5 MHz;
- adjacent channel non-business radio users (i.e. emergency services, PMSE, scanning telemetry, maritime and licence exempt SRDs);
- MOD Fylingdales radar; and
- international users.

4.22 Our coexistence approach and proposed measures are outlined in Annex 3 and summarised in table 4.1. We consider that it would be possible to authorise localised drone use in this

[29] In February 2023, the breakdown of business radio licences from a total of 39,411 licences was: (i) 13,212 technically assigned; (ii) 131 area defined; (iii) 15,581 simple UK; (iv) 9264 simple site; and (v) 1223 suppliers.
[30] There were 47,016, 46,997, 39,765 and 41,869 assignment allocations in the 450 MHz band in 2018, 2022, 2024 and 2025, respectively.
[31] "NB-IoT" stands for narrow band internet of things, and "LPWAN" refers to low power wide area networks.

band without causing harmful interference to other authorised spectrum users, subject to our proposed coordination and technical conditions.

Table 4.1: Summary of proposed drone coordination measures for the 450 MHz band

450 MHz band user	Approach to coexistence
Co-channel business radio	To include an exclusion zone around the service area to geographically separate business radio and drone users
Co-channel drones	No overlap permitted between drone service areas from different licensees to geographically separate drone users from each other
Adjacent channel business radio	Drone deployments must comply with updated effective radiated power (ERP) limits, and out of band emissions (OOBE) limits for typical business radio
Adjacent channel non-business radio (e.g., PMSE, emergency services, scanning telemetry, maritime and LE SRDs)[32]	Adopt a mid-band packing policy[33] by creating a 25 kHz frequency separation between drones and other band users at either side of the six business radio blocks between 453-462.5 MHz (as shown in figure 4.1) to ensure frequency separation between users
Adjacent MoD Fylingdales radar (operating in 420-450 MHz)	Permanent restriction zone in the vicinity of the radar under CAA and National Air Traffic Services (NATS) rules

4.23 To account for the potential for increased interference from the drone's higher operating altitude, we are proposing to include an exclusion zone around the drone's area of operation to separate them from other business radio users operating in the same frequencies. To protect adjacent channel non-business radio users, we are proposing to require additional frequency separation.

4.24 Other adjacent channel users either side of the 450 MHz band (i.e. satellite, Fylingdales radar, and DTT) are more spectrally distant from the channels proposed for drone use than PMSE and emergency services. We consider our proposals to protect immediately adjacent non-business radio users will also be sufficient to protect these users.

4.25 In this section (and Annexes 3 and 4), we use the term "service area" to refer to the area in which a business radio or drone user is authorised to operate, and which is protected, based on the service threshold defined in the TFAC (this may be smaller than the service area originally requested by licence applicants). We use "blocking area" to refer to the area in which a business radio or drone user could cause harmful interference to other licensees, based on the blocking threshold defined in the TFAC.

[32] Not currently protected for business radio licensing, and it is not feasible to manage coexistence through geographical separation given we do not currently licence or manage all of these users.
[33] This means we would prioritise assigning channels for drone use in the middle of the business radio frequency blocks as far as practicable to ensure a minimum spectral separation of 25 kHz.

International coordination

4.26 Some parts of the UK share or are close to international borders, which typically requires coordination to protect users in either country from harmful interference. We already coordinate use of the 450 MHz band with neighbouring countries as explained in Annex 3.

4.27 We have a general Memorandum of Understanding with the Republic of Ireland covering the 450 MHz band and are consulting with ComReg to establish appropriate arrangements to protect services in Ireland, including along the land border with Northern Ireland.

4.28 We invite views from stakeholders on our coexistence analysis (outlined in Annex 3) and our proposed approach to coordination.

Question 3: Do you have any comments on our proposed approach to coordinating drones with other users of the 450 MHz band? In your response, please indicate whether it relates to co-channel or adjacent channel use, and provide evidence for any coexistence issues raised.

There is significant regional variation in 450 MHz spectrum availability for drones

4.29 Our analysis of the 450 MHz band shows that the coexistence environment can be managed effectively, and therefore that it is technically feasible to introduce drones into this band, if channels are available. Based on this, we have assessed where and how much spectrum could be made available for drones.

4.30 In some parts of the UK there is intensive existing use of the 450 MHz band; for example, there is already limited spectrum available for new business radio applicants in urban areas like London and Birmingham. Further, a larger geographical separation area is needed between business radio and drone users, compared with two business radio users.

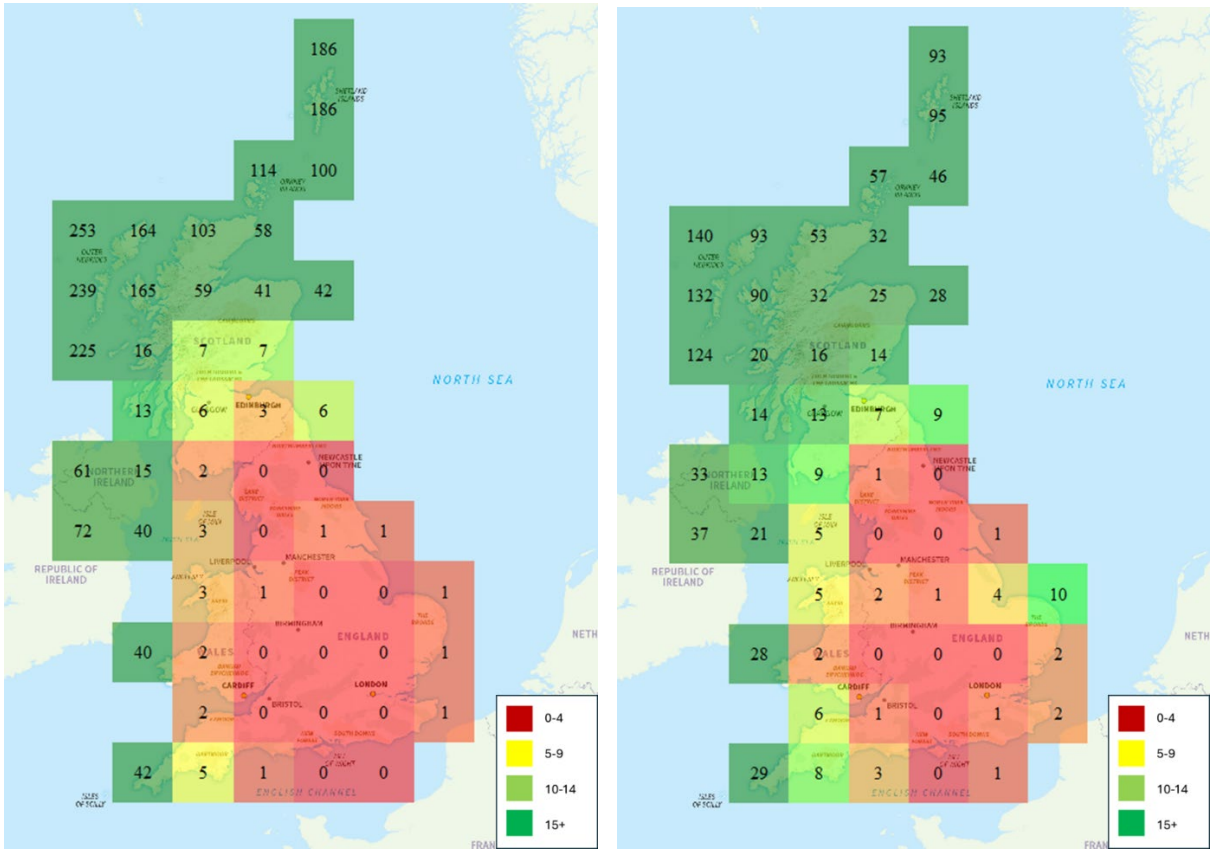
4.31 We therefore carried out a high-level assessment of business radio channels available for coordinated use to give an indicative view of spectrum availability, based on a representative drone deployment.[34] Figure 4.2 shows the number of 12.5 kHz simplex[35] channels and duplex pairs that would currently be available for drone use across the UK, taking account of the coexistence approach outlined above.[36]

[34] Our methodology is set out in annex 4 and uses business radio licensing data from March 2026. It is based on a) a base station operating at 50W ERP (effective radiated power), using an omnidirectional antenna at 15 metres above ground level (AGL); and b) several mobile drone stations operating at 10W ERP, using omnidirectional antennas at 100m AGL.

[35] For a simplex channel, the mobile and base station share the same channel. For a duplex pair, the mobile and base stations use different channels. Note there are a total of 418 possible 12.5 kHz channels that could be available for coordinated business radio use in the 450 MHz band.

[36] It is worth noting that some existing equipment can control around eight simultaneous drones per 12.5 kHz channel (or per duplex pair). As a result, where the maps in figure 4.2 show two channels as available in a grid square it could be possible to deploy as many as sixteen simultaneous drones using existing equipment.

Figure 4.2: Estimated number of simplex channels (left) and duplex pairs (right) available per 100 km x 100 km grid square for a representative drone deployment



4.32 Our analysis shows clear regional variations in the availability of channels for drones. In much of England, especially in urban locations, availability is likely to be limited, particularly for simplex frequencies. However, we expect a greater number of channels to be available in Northern Ireland, Scotland, Wales, and the south west and some other rural parts of England. Overall, we consider that there would be sufficient spectrum available in each of the Nations, and rural England, to support a range of innovative drone use cases including deliveries, infrastructure inspection, and farming.

Impact of additional coordination requirements on spectrum availability

4.33 We have also considered how our proposed drone coordination measures might affect availability across the UK:

- *Co-channel business radio users* - in most areas, this will be the most significant factor affecting spectrum availability as it will require large geographical separation areas.
- *Adjacent channel non-business radio users* - our proposed 25 kHz separation between drones and adjacent non-business radio users further reduced the overall spectrum available for drones. For the six blocks of frequencies in the 450 MHz band, we have identified for drone use (see footnote 19 and figure 4.1), an immediately adjacent non-business radio user exists either side. As a consequence, this reduces the proposed number of 12.5 kHz channels we are making available for drones by 24 channels. However, this is a comparatively small number of channels within the 418 total channels that could be made available (approximately 6%).

Proposed approach to authorising drones in 450 MHz

4.34 Our analysis has shown that drones can coexist alongside other 450 MHz band users, and that spectrum is currently available in parts of the UK. While there are limitations on the availability of spectrum suitable for large scale deployments, especially across most of England, nationwide availability is not a necessary condition for enabling new, innovative drone use in this band where it is feasible. We explained earlier the range of drone use cases that could make immediate use of this spectrum, and that some uses are particularly suited to the rural and remote areas where 450 MHz channels are widely available.

4.35 We consider that, in the short term, the benefits of authorising drone use in the 450 MHz band outweigh any of the low risks of interference identified given the steps we are proposing to take to protect co-channel and adjacent band users. In light of current availability, generally decreasing incumbent allocations, and the very narrowband operating bandwidths drones would require, we do not currently believe introducing time-limited drone use will disproportionately constrain other existing users of the band.

4.36 However, we acknowledge that there are other factors we will need to consider before making decisions about the longer term:

- demand from other existing (and potential) users of the 450 MHz band;
- the wider regulatory environment for drones which is still emerging under the CAA's BVLOS roadmap; and
- demand for drone deployments, and the evolution of drone use cases and alternative bands (including harmonisation progress at 5030-5091 MHz).

4.37 We therefore plan to take a two-phased approach:

a) an initial, interim phase with a 450 MHz drone licence term of three years, to give drone operators access to spectrum as soon as practicable where available; and
b) a longer-term decision on whether ongoing use of 450 MHz by drones is feasible in part or all of the UK following a review.

4.38 This approach would allow near-term benefits where possible, primarily in remote and rural areas, while also enabling us to determine our longer-term approach.

Proposed drone licence product

4.39 We are proposing to introduce an interim licence product for drone use of 450 MHz. At this stage we are seeking stakeholder views on this approach, including the core elements of our proposals as set out below. If we decide to proceed with these proposals, we would consult further on the specific details of the draft 450 MHz drone licence in early 2027.

4.40 For the reasons explained above, the way drones are expected to operate in the 450 MHz band will be technically similar to how business radio users already operate. As coordination with other users is necessary, a licence exempt or light licensing approach has been ruled out.

4.41 A coordinated business radio licence has therefore been the starting point for our proposed 450 MHz drone licence, since they are already designed for:

- an appropriate bandwidth for drones (12.5 kHz channels) and access to existing channels (frequencies) in the 450 MHz band;

- maximum operating power and emission limits that existing 450 MHz drone equipment complies with;
- a designated service area within which the radio equipment may operate; and
- managing coexistence with other 450 MHz band users, including meeting our obligations on international coordination.

4.42 Drones will operate within a designated service area, though with a further geographic separation surrounding that service area to protect co-channel business radio users. An area-based authorisation approach such as this aligns well to our existing **business radio area defined** licence, which splits the UK into geographical areas down to 50 km x 50 km grid squares (as shown in figure 9 of Annex 8 of the TFAC).[37]

4.43 Accordingly, we propose to adapt a standard business radio area defined licence product for drones operating in the 450 MHz band. Adapting an existing licence product generally allows us to move faster when introducing a new authorisation.

Proposed drone technical conditions

4.44 To protect other 450 MHz band users, we would need to modify the standard business radio area defined licence for 450 MHz drone use with new and revised conditions as discussed below.

4.45 Given the area defined licence is currently limited to terrestrial use under schedule 1, we propose to do this by including a new schedule 3 that applies only to airborne operations authorised under the 450 MHz drone licence.

Operating height (above ground level (AGL))

4.46 A key difference between the standard business radio area defined licence and any proposed 450 MHz drone licence will be authorising airborne mobile transmission; drones can operate up to several hundred metres AGL.

4.47 It is important we set the maximum operating height AGL at the right level, given its effect on the availability of spectrum. Higher altitudes would require larger geographic separation to protect other band users and make it more challenging to find available spectrum in more congested parts of the UK (with higher associated licence fees). On the other hand, we do not want to exclude some use cases that need to fly higher.

4.48 To strike a balance, we investigated 100m or 150m AGL as potential options. We found increasing the maximum operating height to 150 metres AGL could sterilise a much larger area than 100m, requiring an additional 50 km x 50 km grid square in each direction as a worst case (results are affected by terrain and clutter). We also know there are a range of use cases that fly around 100m AGL.[38]

4.49 We are therefore proposing a licence condition setting a maximum operating height of 100m AGL. We consider this to be reasonable and proportionate to ensure spectrum is not unduly sterilised.

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[37] The defined grid squares are based on the 2nd series of Landranger maps published by Ordnance Survey (derived by splitting the UK extended grid squares equally into 4). For example, grid square TQ can be split into TQa, TQb, TQc, TQd.

[38] For example, some of the BVLOS trials authorised by the CAA, including StirlingX; this is also the typical height AGL of Prime Air flights in the US.

4.50 As with all of our licences for drones, drone operators will need to ensure they comply with our licence conditions in addition to any conditions required by the CAA – for example, the CAA may specify a lower or higher maximum height for a specific drone flight.

4.51 In a future review, we might consider changes to our licensing approach that would allow us to tailor the operating height requirements to specific applications.

Operating power

4.52 Business radio area defined licences already establish the maximum ERP for base stations and mobile stations at 50W (for a 12.5 kHz channel) and 25W, respectively.

4.53 As is the case for operating height AGL, striking the right balance is important given higher drone ERPs would also require larger geographic separation to protect other band users (with associated higher licence fees), and thereby limit the availability of spectrum for drone use. We found that operating at a maximum power of 25W for drone stations would also sterilise a much larger area, again requiring an additional 50 km x 50 km grid square in each direction as a worst case.

4.54 We are therefore proposing a licence condition specifying a maximum operating power of 10W ERP for drone stations. This is lower than for standard business radio use, but we consider it reasonable and proportionate to ensure spectrum is not unduly sterilised. We also anticipate it gives the best possible chance of finding available channels in less urbanised areas.

Channel bandwidth

4.55 Although business radio channel bandwidths can vary, we propose that airborne transmissions will only be permitted to operate in 12.5 kHz channels. However, we welcome views on whether alternative channel sizes might be needed.

Designated service area

4.56 As is already the case with standard business radio area defined licences, the designated service area is defined by the relevant 50 km by 50 km grid square(s) requested. Relevant grid squares are then listed in schedule 2 of that business radio licence.

4.57 We propose to apply the same approach for 450 MHz drone licences. The designated service area specified in schedule 2 of the licence will include all grid squares covering the drone's requested service area and the additional geographic separation necessary to protect co-channel business radio users (i.e. an exclusion zone determined by the power, operating height AGL and requested service area). The size of the exclusion zone is the number of additional grid squares required around the service area. For example, for a drone operating at 100m AGL and 10W ERP it would typically require a total of sixteen adjoining grid squares (200 km x 200 km), depending on terrain and deployment location.

4.58 In addition, we propose to include the drone's requested service area in the new airborne schedule 3. Applicants would need to submit the requested service area when requesting their licence, and radio equipment authorised under the licence will only be permitted to operate within that area.

Number of base stations

4.59 We will consider the number and location of base stations when determining the grid squares required for a drone licence. If an applicant wishes to deploy a greater number of base stations, or base stations closer to the edges of the requested service area, a greater

number of grid squares may be required to ensure that other users of the band are adequately protected. We do not propose to place a limit on the number of base stations a drone licence application can request, though note it may be more difficult for applicants to find available spectrum if requesting larger numbers of base stations. This aligns with the approach we use for typical business radio applications.

Number of simultaneous drones

4.60 We consider the number of drones that can operate simultaneously at a given time will be self-limiting given the smaller channel bandwidths concerned. Therefore, we do not consider it necessary to propose a condition limiting the number of simultaneous drones.

Proposed non-technical 450 MHz drone licence conditions

4.61 We propose to add the following non-technical licence conditions into the new airborne schedule 3 of the 450 MHz drone licence, having also considered the conditions in the standard UAS licence. We welcome stakeholders' views on them:

- **Licence fees** – we propose that the existing licence fee structure for business radio area defined licences would also apply to the 450 MHz drone licence. The fee can be affected by factors such as location in the UK and total number of grid squares. Our business radio fees calculator provides an overview of likely fees for this licence type.
- **Limited licence term under initial phase** – with the 450 MHz band still considered an innovation band for drones, demand still developing, and CAA constraints on BVLOS drone use remaining in place for the near term (until at least 2028), we consider it proportionate and appropriate to apply a limited licence term of three years under an initial phase (see also "Reviewing our initial authorisation approach" below for a more detailed explanation of our plans).
- **Revocation notice** – We propose to allow the 450 MHz drone licence to be revoked after providing one year's notice for any reason.
- **Frequency flexibility** – we propose to require that any radio equipment authorised under the proposed 450 MHz drone licence is fully frequency flexible to operate between 450-470 MHz. Doing so will allow drone licensees to retune in the future more easily, should this be needed for spectrum management reasons.
- **Complying with equipment standards** – we propose to add a similar requirement to the existing UAS condition to ensure that any drone radio equipment authorised under the proposed 450 MHz drone licence has the appropriate approvals (i.e. complies with the Radio Equipment Regulations 2017 and/or equipment approvals by the CAA).

4.62 We are not proposing to stipulate in the licence whether the 450 MHz drone licence is used for either primary or secondary (back-up) links.

Reviewing our initial authorisation approach

4.63 If we decide to proceed with our proposals, we intend to keep the 450 MHz drone licence under review as drone deployment continues to evolve. We consider a review point within three years of the first licences being issued would be appropriate to provide clarity to industry on whether longer term use of the band will be feasible. We would expect that this review might identify opportunities to modify and adapt our approach and/or 450 MHz drone licence based on our operational experience to ensure that other band users

continue to be suitably protected and that the spectrum available for drones is not unnecessarily restricted.

4.64 Any fixed term 450 MHz drone licence we issue under the proposed initial phase would offer no expectation of continued or ongoing use. However, to support future innovation in this sector we are keen to identify longer term opportunities in this band where feasible, such as in areas with low alternative demand for these frequencies – including many rural and remote areas.

Our proposals for the 450 MHz band

4.65 In summary, our proposed 450 MHz drone licence conditions, based on a modified business radio area defined licence are:

- maximum operating height of 100m AGL;
- maximum operating power of 10W ERP (for mobile stations);
- channel bandwidth of 12.5 kHz;
- designated service area based on applicant's requested service area (including an exclusion zone to protect other band users);
- licence fee structure consistent with existing business radio area defined licences;
- initial fixed licence term of three years (subject to a one year revocation notice); and
- that drone radio equipment must be frequency flexible within the 450 MHz band, and have the appropriate approvals (i.e. comply with the Radio Equipment Regulations 2017 and/or with equipment approvals by the CAA as appropriate).

4.66 We invite comments from stakeholders on our proposed licence conditions and authorisation approach for the 450 MHz band.

Question 4: Do you have any comments on our proposed 450 MHz drone authorisation approach? Please provide any specific views (including technical justification where relevant) on:

- the proposed technical conditions, including operating height AGL, power, channel bandwidth, designated service area, and number of base stations;
- the proposed non-technical conditions, including licence fees and term, frequency flexibility and complying with CAA rules and radio equipment standards; and
- reviewing our initial authorisation approach.

5. Enabling interim drone use of the 5030–5091 MHz band

5.1 In this section, we present our proposals for enabling drone use of 5040-5060 MHz on an interim five year basis. In this band, there are globally harmonised standards being developed but not yet finalised. For this reason, we are seeking stakeholders' input to develop proposed technical requirements for coordinating between drone users in the UK. We are also proposing and seeking input on other technical aspects. Overall, our proposals in this section are less mature than those in 450 MHz, which largely sit within an existing framework (used for business radio).

5.2 In the longer term, we would plan to make more of the 5030-5091 MHz band available, once international technical harmonisation is complete, and would consult on proposals to phase out the interim authorisations and replace them with a longer-term spectrum authorisation framework.

Why we are proposing this band

5.3 The 5030–5091 MHz band has characteristics that make it particularly well suited to supporting the future growth of drone operations. There is already an emerging ecosystem in this band, driven in part by developments in the United States and other international markets. This reflects a broader global consensus that the band should be used for drone control links. As a result, we consider it likely that the device and equipment ecosystem will continue to expand, supporting increased availability of interoperable solutions and economies of scale over time. We are also seeing early evidence of demand in the UK, with stakeholders making use of innovation and trial licences to deploy systems in this band.

5.4 In addition, the band offers important technical advantages compared to alternative spectrum options. It is relatively unused, meaning that drone users would not need to coexist with a wide range of incumbent services, which could otherwise constrain performance—particularly in dense urban environments. The relatively large amount of contiguous bandwidth also provides scope to support more advanced use cases and, over time, enable larger-scale or more complex operations. Taken together, these factors suggest that the 5030–5091 MHz band could play a key role in enabling innovation and unlocking the benefits of drone applications.

5.5 In light of these considerations, we are proposing an initial, interim release of spectrum in the 5030–5091 MHz band to support early deployment and experimentation in the UK, while international harmonisation work continues. This approach would allow stakeholders to begin developing and scaling use cases in the near term, while retaining flexibility to align with future global frameworks as they emerge.

5.6 We are proposing licences with a "sunset clause" in 2032 to ensure there is sufficient time for a transition. A "sunset clause" means that all licences would have an end date set at 2032, regardless of date of issue, allowing the band to be clear from that year on. We anticipate that harmonisation should happen well in advance of 2032 – and if that is not the case, we would review and consider extending interim arrangements.

5.7 We are consulting on:

- the high-level plan to make part of the band available as soon as possible, including the "sunset clause" in 2032;
- the portion of the band to make available (we propose 5040-5060 MHz to help manufacturers by aligning with the US); and
- a suitable set of technical conditions.

International developments

5.8 The 5030-5091 MHz band was identified and allocated by the International Telecommunications Union (ITU) for drone control links fourteen years ago, at the World Radiocommunications Conference (WRC) in 2012 (WRC-12). The international technical work to standardise the band has been progressing since then, but there is no agreed timetable for conclusion.[39] International harmonisation of the band will eventually allow use of the band for drone control from both terrestrial and satellite networks.[40]

5.9 More recently, the FCC in the United States, Innovation, Science and Economic Development Canada (ISED) in Canada and the Australian Communications and Media Authority (ACMA) in Australia have adopted varying approaches to making the band available. ACMA has allowed access to the 5055-5065 MHz block, in line with the ITU draft recommendation, although this is for line of sight (LoS) use only and within specific technical limits, on an interim basis to meet domestic demand, while further work proceeds on preparing 5030-5091 MHz for command and non-payload communications (CNPC) operation in Australia in line with international developments.

5.10 ISED launched a consultation in February 2026, regarding the spectrum policy, licensing and technical framework for drones in the 5030-5091 MHz band and in certain bands used for commercial mobile services, seeking commentary on a prospective band plan based on either the work of the International Civil Aviation Organization (ICAO) or the option being considered by the FCC, on how the various drones functions would operate in Canada.

5.11 ISED's proposal is that for aircraft stations (i.e. drones) that communicate with terrestrial aeronautical stations, the radio apparatus on board aircraft stations used for said communication could be exempt from licensing, provided the technical requirements outlined under Section 15.1(2) of the Radiocommunication Regulations are met. For the terrestrial aeronautical stations of remotely piloted aircraft systems (RPAS[41] – another term for drone), ISED is considering using current licensing frameworks to authorise this operation in the 5030-5091 MHz band, with licensees needing to comply with certain technical conditions. ISED also proposed to adapt the existing authorisation framework to

[39] Harmonising use of the band by drones has been complex due to the need to incorporate both satellite and terrestrial use and selecting appropriate protection criteria that ensure drone use is protected and protects other users. The timescale for finalisation of the ITU-R and ICAO work is unclear.

[40] Work has been ongoing at the ITU and ICAO to standardise the 5030-5091 MHz band for UAS control links. ITU-R WP5B has been developing a draft recommendation on the parameters and protection criteria required for drone use of the band, although a target publication date has not yet been agreed. ITU M.[AM(R)S_AMS(R)S_CHAR_5GHZ]

[41] What's considered an unmanned aircraft? – *CAA*. RPAS are comprised of a remotely piloted aircraft, its associated remote pilot station(s), and required control links.

use generic licensing of earth stations for the satellite component of RPAS operations, where they communicated with space stations.

5.12 The FCC have initially allowed access to 5040-5060 MHz on an interim basis and intend to plan the band more fully once they introduce a dynamic frequency management system. In its Report and Order in August 2024, the FCC decided that it would allow non-networked access (NNA)[42] equipment and operations in a segment of the 5030-5091 MHz band solely for control links using the RTCA DO-362A standard[43], or technical requirements based on that standard, to govern NNA equipment and operations.

5.13 The FCC also decided to adopt a license-by-rule approach. In order to be permitted to use NNA spectrum, potential users must use certified, FCC-approved NNA stations, and comply with the applicable NNA rules, but they would not need to obtain individual spectrum licenses.[44]

Coordination between drone users

5.14 Drone use in this band has not yet been standardised, although there are various initiatives underway aiming to harmonise parameters to be used:

- ITU Radiocommunication Sector Working Party 5B (ITU-R WP5B) is currently developing a draft ITU-R recommendation M.[AM(R)S_AMS(R)S_CHAR_5GHZ], which sets out various parameters for drone use including powers, operational bandwidths, protection criteria, and operational bandwidths.
- The RTCA DO-362A standard, which sets out the minimum operational parameters for drone equipment in this band. The requirements of this standard have also been incorporated into FCC's rules for radio equipment use.
- Work on an ICAO standard is still ongoing, although we note that progress has been slow due to the need to incorporate a variety of different system architectures, for example to accommodate both terrestrial and satellite use.

5.15 In the absence of a harmonised standard, the current access regimes allow use of different parameters and frequency bands. For example, the FCC has made 5040-5060 MHz available with parameters in line with RTCA DO-362A, while the ACMA has made 5045-5055 MHz available, with parameters in line with the development ITU-R recommendation.

5.16 Given the current lack of standardisation, we are seeking input on the parameters that would be appropriate for use in the UK by drones. We have initial proposals for technical parameters as below, but we are currently missing information about required protection criteria of the expected drone equipment, and the use cases that drone use of this band would support. Input from stakeholders on this point will support our decisions around the access regimes that are most suitable for the band. We are minded to base any future UK authorisation on the developing ITU-R conditions, as outlined in table 5.1. Our initial

[42] Non networked access means a point to point control link, that does not travel through a network.
[43] RTCA is Radio Technical Commission for Aeronautics, a standards body for the aviation industry. RTCA DO-362A sets out the minimum operational performance standards (MOPS) for the 5030-5091 MHz band that are needed by the CNPC link system airborne and ground equipment to achieve a terrestrial point-to-point or point-to-multipoint communication functionality via direct radio line-of-sight operation to support UAS operating in the United States National Airspace System – these include power limits, emission limits, and frequency accuracy requirements (See also the FAA TSO-C213a).
[44] See p. 20 of the FCC's 2024 Report and Order.

assessment is that these parameters are most likely to ensure reasonable alignment with any future harmonised standard.

Table 5.1: Proposed drone operational parameters for the 5030-5091 MHz band

Parameter	Drone station	Ground station
Frequency band (MHz)	5040-5060	5040-5060
Duplex	TDD[45]	TDD
Maximum bandwidth (kHz)	250	250
Maximum antenna gain (dBi)	2 (omnidirectional)	20
Maximum EIRP (dBm)	40	60
Suppression in adjacent channels (dBc at 2 MHz offset)	-66	-66
Maximum service range (km)	550	550
Maximum altitude (metres AMSL)[46]	22860	22860
I/N (dB)	-6	-6

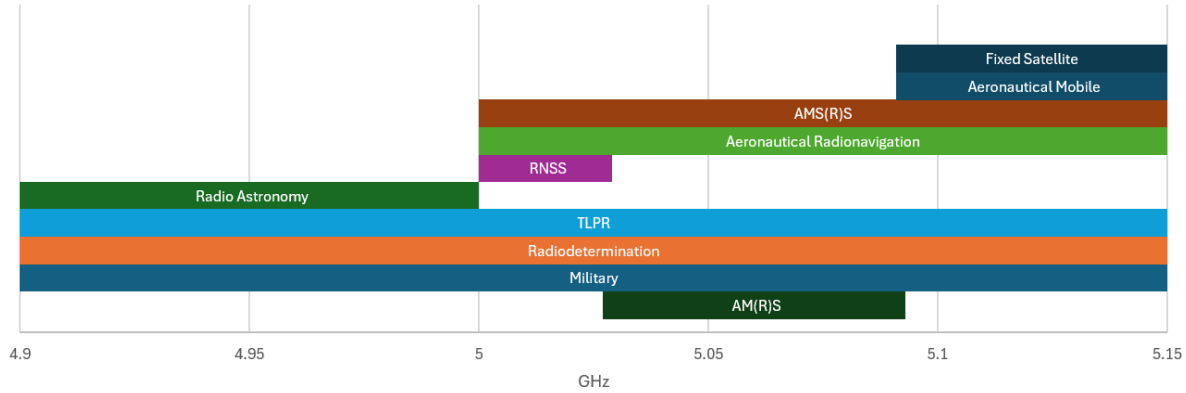
Coexistence with other services

5.17 In this section, we set out our initial views on how drone control links could coexist with other co- and adjacent channel users in the 5030-5091 MHz band, as shown in figure 5.1. Full details of our analysis are shown in Annex 5.

- Other co-channel users include aeronautical radionavigation service (ARNS) aids (5000-5250 MHz, primarily for microwave landing systems), military (4200-5850 MHz) and the radiodetermination service (4.5-7 GHz, including tank level probing radar (TLPR). Drone use would operate under the aeronautical mobile (route) service (AM(R)S) and aeronautical mobile satellite (route) service (AMS(R)S) allocations.[47]
- Users of adjacent frequency bands include radio astronomy (below 5 GHz), radio navigation satellite service (RNSS, 5000-5030 MHz), fixed satellite service (FSS, 5091-5150 MHz), aeronautical mobile service (AMS, 5091-5150 MHz), radar level gauges (above 5.15 GHz), and wireless access systems (WAS) like Wi-Fi (above 5.15 GHz).[48]

[45] Time division duplexing (TDD) means that the drone and the ground station use the same frequencies, but not at the same time – they effectively "take turns", with transmissions from the base station stopping to allow the drone to transmit and so on.
[46] We understand these maximum altitudes support a wide range of use cases, many of which use much lower altitudes.
[47] Compatibility studies to support the control link allocation were completed in preparation for WRC-12 as set out in ITU-R M.2205. The studies did not consider terrestrial links however.
[48] Note that use of the spectrum by WAS is on a licence exempt basis, and therefore operates on a non-interference, non-protection basis.

Figure 5.1: 5 GHz band plan



5.18 Overall, we think that the only additional technical coordination requirements will be for RNSS and radio astronomy:

- WRC-12 agreed protection requirements for RNSS from the proposed drone use, which we consider sufficient to ensure protection while harmonisation efforts continue (EIRP density limit of −75 dBW/MHz in the frequency band 5010-5030 MHz, as set out in Radio Regulations footnote 5.443C).
- We expect that radio astronomy would require additional protection from drone use, likely through a geographical exclusion zone. We welcome input from stakeholders on the appropriate means of ensuring protection, and the potential appropriate size of exclusion zone.

5.19 More broadly, we note that there are few active co-channel users of the band, as microwave landing systems (MLS) are not in use in the UK. TLPR is likely well shielded from the proposed drone use, and we therefore consider that coordination would not be required.

5.20 The frequencies we are proposing for drone use (5040-5060 MHz) are well separated from other adjacent users, which will provide protection to adjacent users while harmonisation efforts continue. We consider this should be sufficient to protect AMS and FSS use, noting that there is currently no licensed use of FSS in the UK in this band, and that AMS use is localised.

Our proposals for the 5030–5091 MHz band

5.21 We propose to make a portion of the 5030–5091 MHz band available ahead of concluding the international harmonisation process (the timeline for which is still unclear).

5.22 We propose the portion should be 5040-5060 MHz. This is because this portion was released in the US market, improving equipment availability and cost; it also encompasses the portion released in the Australian market. The size of the portion to be released strikes a balance between ensuring there is sufficient spectrum for early deployments and keeping part of the band ready to be used by the next generation of equipment once harmonised conditions are available.

5.23 Based on the above, we are proposing the following 5030-5091 MHz band drone licence conditions:

- frequency band 5040-5060 MHz;

- maximum channel bandwidth of 250 kHz;
- maximum drone operating power of 10 W EIRP;
- maximum base station operating power of 1 kW EIRP;
- EIRP density limit of −75 dBW/MHz in the frequency band 5010-5030 MHz;
- comply with any future RAS exclusion zones;
- designated service area based on applicant's requested service area;
- initial licence term of five years; and
- that drone radio equipment must be frequency flexible within the 5030-5091 MHz band and have the appropriate approvals (i.e. comply with the Radio Equipment Regulations 2017 and/or with equipment approvals by the CAA as appropriate).

5.24 We are seeking views from stakeholders on appropriate technical conditions for coordinating between drone users in the 5030-5091 MHz band.

Longer term outlook

5.25 Once there is an agreed global standard, we propose to phase out these licences and update UK authorisations to align with it. Given the uncertainty around the timing for this, we are proposing an interim approach to enable first generation of deployments in the 5030-5091 MHz band. We issue these licences with a fixed end date ("sunset clause") in 2032, meaning that all interim licences will have the same end date, irrespective of their date of issue. This would simplify any transition to future standards across a wider range of frequencies after this date.

5.26 We will continue to monitor international developments and might consider extending this interim approach in a future review – for example if there is still no harmonised standard around 2030.

Question 5: Do you have any comments on our proposed 5030-5091 MHz drone authorisation approach? Please provide any specific views (including technical justification where relevant) on:

- the portion of the band proposed for early release (5040-5060 MHz);
- the proposed technical parameters and approach to coordinating drones and/or protecting other users of the band; and
- the proposal to phase out licences once there is global harmonisation, the required transition period and sunset clause.

6. Proposal for drone detection radar licence: 16 and 24 GHz

6.1 With the fast development of drone technology, there are growing concerns about the risk of malicious or harmful use of drones by criminal or hostile actors, including near critical national infrastructure and other sensitive sites.[49]

6.2 The growing risk from hostile drones is a global trend, fuelled by innovation and the use of drones as a weapon of war and disruption. The UK Government clearly stated the need to prepare for these threats in the June 2026 Defence Investment Plan, and the European Commission announced plans in February 2026 to improve detection, deterrence, and counter-drone capabilities against hostile actors.[50]

6.3 These circumstances illustrate the potential safety risks associated with increased drone activity, as well as the need to be able to detect it as accurately and as far in advance as possible. We have seen growing interest in drone detection radar technology – i.e. radar that is designed to detect the presence of drones. For the reasons above, we believe this demand is likely to continue to grow.

6.4 We have identified two possible bands that can be made available for drone detection radar: 24 GHz and 16 GHz; this section details our proposals to make these available.

6.5 We understand that stakeholders may seek to access to drone radar spectrum before we make decisions on these bands. We would consider those via our usual processes as explained in Section 8 and would advise any potential applicants to read the remainder of this section for context before approaching us with specific requests.

24 GHz (24.05–24.25 GHz)

6.6 We have identified this band to help meet demand for drone radar for two reasons:

- There is equipment available in the global and UK markets. These products are often aimed at defence and security customers, and at the US market, where the band has been designated for this use.[51]
- Current users of the band can operate and coexist with this equipment in the vast majority of locations (see next subsection).

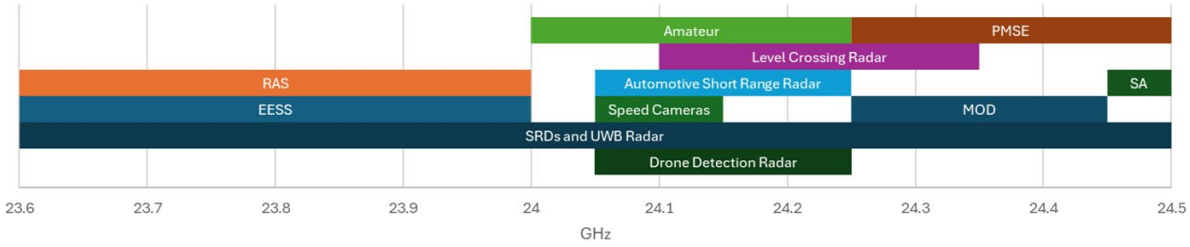
Coexistence with other services

6.7 To support our proposal to make the 24 GHz band (24.05-24.25 GHz) available for use by drone detection radar systems, we have assessed how they might coexist with other incumbent users in the band, as shown in figure 6.1.

[49] For example, the UK Government has launched a £1.85 million competition to develop counter-drone solutions for sensitive sites.
[50] Commission disburses €3.9 billion for drones under the €90 billion Ukraine Support Loan – *European Commission*
[51] See for example, Notice of Proposed Rulemaking, 13 January 2025 - *FCC*

- Co-channel users include amateur services (24-24.25 GHz), level crossing radar systems (24.1-24.35 GHz), automotive short-range radar (24.05-24.25 GHz), speed camera systems (24.05-24.15 GHz), and short-range devices (21.6-27 GHz).
- Adjacent channel users include PMSE (24.25-24.5 GHz), shared access (24.45 GHz upwards), radio astronomy (23.6-24 GHz), and the earth exploration satellite service (EESS in 23.6-24 GHz).

Figure 6.1: 24 GHz band plan



6.8 Full details of our coexistence analysis are set out in Annex 6. As part of this assessment, we designed our proposed technical conditions (in table 6.1) to ensure coexistence risks will be low. We summarise below some of the key points from our assessment (these already take account of the proposed technical conditions).

6.9 We consider the risk of harmful interference to co-channel services to be low. We are not aware of widespread use of the band by amateurs or automotive short-range radar.[52] We have undertaken measurements that show the risk of harmful interference to speed cameras and level crossing radar is low.

6.10 For most adjacent channel services, the risk of harmful interference is also low. We are not aware of any use of the band by PMSE,[53] and the deployment density we anticipate for drone detection radars is much lower than required to meet the limits agreed at WRC-19 to protect EESS from mobile deployments in 23.6-24 GHz.[54] We consider that radio astronomy in 24 GHz is highly unlikely to suffer harmful interference from the presence of drone detection radar unless they are located very close (less than 1 km) to a radio astronomy site.[55] We therefore propose a 1 km exclusion zone around each site.

Our proposals for technical conditions in the 24 GHz band

6.11 We propose to authorise 24 GHz radar through the proposed drone detection radar licence (see Annex 12) given the need for coordination requirements around radio astronomy sites. However, we are not proposing to coordinate drone detection radar users with each other given the low risk of harmful interference.

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[52] Manufacturers tend to favour higher frequency bands such as the 76 GHz band, and we decided to proceed with closing the 24 GHz band to new authorisations for automotive short-range radar in our 2022 "Decision to amend the licence exemption conditions for the use of certain Short-Range Devices". This decision took effect through The Wireless Telegraphy (Exemption) (Amendment) Regulations 2023.

[53] Our 2023 Statement on "Enabling mmWave spectrum for new uses" gave notice of our intention to close the band to PMSE use in the coming five years.

[54] We consider that the limits agreed for protecting EESS by IMT are a useful starting point in assessing coexistence between EESS and drone detection radars.

[55] There are six radio astronomy sites in the UK, located at Cambridge, Darnhall, Defford, Jodrell Bank, Knockin and Pickmere.

6.12 We propose to adopt the technical conditions shown in table 6.1, which we developed taking account of existing equipment and the need to avoid harmful interference to other users as above for the 24 GHz band.

Table 6.1: Proposed technical conditions for drone detection radar in 24 GHz

Parameter	Value
Permitted frequencies (GHz)	24.0675 – 24.2325
Maximum bandwidth (MHz)	50
Maximum EIRP (dBW)	23.9
Maximum out of band emissions in the 23.6-24 GHz band (dBW/MHz)	-45.2

16 GHz (15.7-16.4 GHz)

6.13 We identified this band for similar reasons to the 24 GHz band:

- There is equipment available in the global and UK markets. These products are often aimed at defence and security customers. We have issued several licences for innovation and trial use in this band.
- We think coexistence with other services is feasible. While this band is used by the MOD, it has indicated to us they will be able to coexist with civil use in many locations, subject to a case-by case coordination process. We are also proposing to only approve applications which we assess as able to coexist with radio astronomy use of adjacent frequencies.

Coexistence with other services

6.14 Any drone detection radar use of the 16 GHz band would need to coexist with other co- and adjacent channel users. MOD (15.4-17.7 GHz) is the main user of the frequency band, and any use for drone detection radar would need to be agreed and coordinated with the MOD.

6.15 Other adjacent channel users of the band include FSS (Earth-to-space) (15.43-15.63 GHz), ARNS (15.4-15.7 GHz), radiolocation service (15.4-15.7 GHz), radio astronomy (15.35-15.4 GHz), and EESS and space research service (15.35-15.4 GHz).

6.16 ARNS use of the 15.4-15.7 GHz band is typically for multi-purpose radar and aircraft landing systems, as set out in ITU-R M.2170. As the proposed drone detection radar would be for localised use and would use an adjacent frequency band to ARNS radars, we consider that the risk of harmful interference is likely to be low. We note that coexistence between radars in the aeronautical bands is well understood and that well planned radar systems can coexist well.

6.17 Radio astronomy use of 15.35-15.4 GHz has recognised spectrum access protection granted at several sites (see footnote 55). The use of 15.4-15.7 GHz is subject to footnote 5.511F, which ensures protection of radio astronomy through a power flux density limit.[56] We consider that any use of 15.7-16.4 GHz for drone detection radar systems would need to

[56] Footnote 5.511F requires that stations operating in the radiolocation service shall not exceed a power flux density of -156dBW/m^2 in 15.35-15.4 GHz at any radio astronomy site for more than 2% of the time.

comply with these limits to protect radio astronomy. We would perform a case-by-case analysis to ensure that these limits are met when we coordinate the licence; and would only approve applications where this is the case.

Our proposals for technical conditions in the 16 GHz band

6.18 We propose to authorise 16 GHz radar through the proposed drone detection radar licence (see Annex 12), given the need for case by case coordination with the MOD and RAS. We propose to require the following information from applicants to enable coordination:

- geographical location;
- EIRP;
- duty cycle;
- OOBE;
- antenna height; and
- antenna pattern.

6.19 We may review this required information after practical experience of coordination with the MOD and RAS, with a view to simplifying if possible.

6.20 We propose to adopt the technical conditions shown in table 6.2, which we developed taking account of existing equipment and the need to avoid harmful interference to other users as above for the 16 GHz band.

Table 6.2: Proposed technical conditions for drone detection radar in 16 GHz

Parameter	Value
Permitted frequencies (GHz)	15.7-16.4
Maximum bandwidth (MHz)	50
Maximum EIRP (dBW)	53

Proposed non-technical licence conditions for the 16 and 24 GHz bands

6.21 For most non-technical licence conditions, these will be the same as other licences that we issue and are contained in our General licence conditions booklet OfW597. We propose the following specific non-technical licence conditions for a new drone detection radar licence.

a) **Licence term** - we propose that the licence should be issued for an indefinite duration, subject to standard revocation conditions (which includes a five year revocation notice). Once the licence has been issued, the licence would remain in force, subject to payment of the appropriate licence fee and all other licence conditions continuing to be met.
b) **Licence fee** – we propose that the licence would be subject to a cost-based fee of £75, payable annually. This is in line with our standard UAS operator radio licence fee.
c) **Geographical boundaries** – for the 24 GHz band, we are proposing a UK wide authorisation (subject to the 1 km exclusion zone around each radio astronomy sites as set out in paragraph 6.10 and footnote 55). For the 16 GHz band, we are proposing an area defined authorisation due to the need to coordinate with the MOD, and the area

definition will also implicitly protect RAS. Our understanding is that the MOD envisages authorising the 16 GHz band for fixed used only; therefore, in practice the size of the licensed area would reflect the need to adjust equipment location within a site, rather than allowing deployment flexibility across sites.

d) **Tradability of licences** – we are proposing that the licensee would be able to transfer their spectrum rights and obligations in a total transfer of all rights to another party.
e) **Record keeping** – we propose to require licensees to keep full and accurate records of the locations of equipment deployed under this licence.

6.22 We invite feedback on our proposed licence conditions for drone detection radar in the 16 and 24 GHz bands, as also set out in the draft licence in Annex 12.

Question 6: Do you have comments on our proposal to create a new drone detection radar licence for the 24 GHz band, including the proposed technical and non-technical conditions, the proposed draft licence in Annex 12, and our coexistence analysis in Annex 6? Please provide evidence for any issues raised.

Question 7: Do you have comments on our proposal to create a new drone detection radar licence for the 16 GHz band on a case-by-case basis, including the proposed technical and non-technical conditions and proposed draft licence in Annex 12? Please provide evidence for any issues raised.

7. Call for input – future spectrum demand for drones

7.1 The drone sector is developing rapidly, with uncertainty over which specific technologies and spectrum solutions will be important in the UK, and when.

7.2 In this section we identify how drone operations and related services may drive demand for additional spectrum access in the longer term and seek stakeholder input on this.

Longer-term spectrum demand for drone control links

7.3 In sections 3-5 of this document, we explain our proposals to enable near term access to the 450 MHz and 5030-5091 MHz bands for drone control links. We are interested in whether there are any other bands which you consider may be suitable for this purpose in the longer term (i.e. 2030 and beyond).

Question 8: Have you identified any other frequency bands we should consider for drone control links in the longer term?

Satellite bands

7.4 Ofcom has already authorised access to several frequencies in satellite bands for drones in the UAS licence introduced in 2023. It permits use of satellite frequencies by drones in parts of the Ka and Ku bands, L band, and 2 GHz band.[57] The full list of satellite bands is shown in Annex 7.

7.5 We are separately consulting on expanding the spectrum available for satellite connectivity services to use aeronautical satellite communications, but have not proposed to make the additional frequencies available for drone use. We noted that this would require a more detailed coexistence analysis and could be challenging, given the density of fixed links which the drone could pass through in the relevant frequencies.

7.6 We welcome stakeholders' views on whether the existing satellite authorisation framework and frequencies meet the current needs of drone operators, and the potential benefits of expanding the authorised satellite frequencies for drone use.

Question 9: Do you have any comments relating to the satellite frequencies available for drone control links?

Drone safety / onboard radar

7.7 We are also seeking input on potential future demand for additional spectrum to support drone safety functions.

7.8 The CAA noted in June 2025[58], that the biggest impediment to the continuing growth of the BVLOS sector is the risk of a mid-air collision between an obstacle and UAS unable to sense

[57] Use of NGSO (non-geostationary satellite orbit) systems is not currently permitted in Ka band.
[58] Detect and avoid policy concept – Consultation response summary - *CAA.*

it or avoid it beforehand. To mitigate these risks, we are currently monitoring three bands where we may bring forward authorisation proposals in the coming years:

- **Onboard drone radar at 15 GHz and 76 GHz -** these are used in 'detect and avoid' (DAA) systems. A DAA system typically includes a radar to detect other aircraft or stationary barriers like power lines, allowing the drone to avoid collisions.
- **Ground infrastructure to support electronic conspicuity (at 978 MHz)** - these are systems that can make aircraft pilots aware of the presence of drones and other airspace users, by broadcasting coordinates.

15 GHz (15.4-15.7 GHz) – onboard radar

7.9 There is ongoing international work examining the scope for 15 GHz to be used for onboard DAA radar. Specifically, work within ITU-R WP5B is across two strands: a more general handbook on spectrum for DAA radar for drone systems, and a recommendation on the characteristics and protection criteria for 15 GHz use onboard DAA radar.[59] As of the most recent WP5B meeting (May 2026), both strands are still at the 'working document' stage with multiple open issues.

7.10 There are a number of coexistence scenarios to be assessed, as the 15 GHz band is used for ground-based aeronautical radar systems, including surface-based ATC (air traffic control) radar for airport surveillance detection equipment, aircraft landing systems, aircraft multipurpose radars for radionavigation, radiolocation (including radio altimeters), weather radar, and radar sensing and measurements (particularly for smaller aircraft and helicopters). While coexistence between existing systems is well understood, the extension for onboard drone radar would need to be considered prior to widespread adoption.

7.11 Eventual use of this band would also require us to consider coordination with adjacent users. These include passive observations by radio astronomy and the EESS (15.35-15.4 GHz); use of 15 GHz is subject to footnote 5.511F protecting radio astronomy (see footnote 56). The MOD also makes use of the adjacent spectrum (15.7-17.2 GHz).

7.12 We will continue to monitor developments at ITU-R WP5B, and plan to consider making proposals for DAA use of this spectrum in future when international work has progressed sufficiently.

76 GHz (76-77 GHz) – onboard radar

7.13 In our 2025 Statement, Updating Wireless Telegraphy Exemptions, we set out our intention to make the 76 GHz band available on a licence exempt basis for obstacle detection systems on crewed rotorcraft. These systems are designed to warn the aircrew of obstacles including power lines, poles, and masts in initial or final phases of flight, as well as during hovering phases.

7.14 Our decision incorporated provisions in ERC Recommendation 70-03, to align the UK with harmonised conditions across Europe. Licence exempt use of the 76 GHz band by crewed

[59] Access to documents requires an ITU user account.

rotorcraft is subject to several technical conditions to protect other users of the band[60], as set out in ECC Decision (16)01.[61]

7.15 We received responses to our consultation that highlighted demand to use the 76 GHz band for similar obstacle detection systems for drones. However, the proposed conditions for drone use of the 76 GHz band, as set out in ETSI TR104 078, are different to those covered by the crewed rotorcraft licence exemption, such that any extension to the licence exemption would require further study.[62] In January 2026, Working Group Spectrum Engineering (WGSE) adopted a new work item (WI SE24_84) to consider complementary studies with respect to TR104 078, aiming for a September 2027 completion date.

7.16 In our 2025 Statement Updating Wireless Telegraphy Exemptions, we noted that we are supportive of this ongoing work, as it has the potential to enable the deployment of additional equipment on drones. We will continue to engage in the relevant European Conference of Postal and Telecommunications Administrations (CEPT) meetings (SRD/MG and WG FM) and will consider the outcome of the CEPT discussions and any subsequent studies before deciding on the appropriateness of amending this licence exemption further.

Question 10: What are your needs and priorities for accessing spectrum for drone safety? Do you have interest in future use of 15 GHz and/or 76 GHz, or other specific frequencies and bands for similar drone safety use?

978 MHz – scope for ground infrastructure to support UAS safety

7.17 In March 2025, Ofcom and the CAA jointly made 978 MHz frequencies available for using additional safety equipment (universal access transceiver or UAT).[63] These frequencies host a technology called "automatic dependent surveillance–broadcast" (ADS-B)[64], which allows aircraft to alert other airspace users of their presence by broadcasting their identification, position, altitude and velocity to them, as well as to ATC. Ofcom and the CAA are now considering whether to extend the UAT capability by authorising complementary ground-based systems, which would use the same 978 MHz spectrum as the authorised aerial component. These ground stations could relay additional information to pilots such as weather reports and real-time air traffic information. We may also consider "beacons" that can highlight a small area where there is additional air traffic caused by drones, model aircraft, or gliders.[65]

7.18 The frequencies used at 978 MHz are part of an ARNS band (960- 1164 MHz that is currently shared with low power radio microphones used for programme making and special events

[60] Other users of the band include fixed links, tank level probing radar, amateur service, transport and traffic telematics, and radio astronomy. Studies considering the coexistence of crewed rotorcraft obstacle detection systems with these other services are set out in ECC Report 222.
[61] ECC Decision (16)01 requires a transmit power limit of 30 dBm peak EIRP and 3 dBm/MHz average power spectral density and duty cycle limit ≤ 56 %/s.
[62] TR104 078 proposes a higher peak and mean EIRP and a higher duty cycle than the technical conditions for crewed rotorcraft obstacle detection systems set out in ECC Decision (16)01. TR104 078 also proposes use of DAA systems during the cruise phase of flight, while the permitted use for crewed rotorcraft is limited to the initial and final phases, as well as during hover.
[63] See Ofcom/CAA joint statement on use of 978 MHz for UAS and change in audio PMSE access.
[64] The CAA defines ADS-B in its electronic conspicuity policy.
[65] Report on trial of ADS-B obstruction beacons on 978 MHz UAT, p. 3 - *uAvionix*

(PMSE). The sharing arrangements were introduced in our 2016 Statement on New Spectrum for Audio PMSE.

7.19 That Statement made it clear that, as the aeronautical use changes, we would update the availability of PMSE spectrum, in a way that maintains aeronautical safety, via agreement with the CAA. Using this process, we have already moved outdoor PMSE use out of the frequencies used by these services as part of the work on the aerial UAT and will continue to follow this process when required. We note as part of our Sector Spectrum Review of PMSE we are considering access to all relevant frequency bands in supporting future PMSE demand, including the role of existing, alternative and potential additional spectrum.

7.20 The work on 978 MHz is set to progress over the coming year, and we welcome input on the potential level of interest from industry and other stakeholders.

Question 11: Do you have any interest in ground based UAT to complement the aerial component in 978 MHz licences?

Drone detection via mobile networks – ISAC

7.21 We anticipate that further technological developments will support drone detection in future. For example, integrated sensing and communications (ISAC) is a technology that uses the existing mobile networks and spectrum to sense the location of objects. ISAC can potentially be used for detecting and tracking drones, working in a similar way to radar. The mobile standards body 3GPP is working on potential standardisation of the technology.

7.22 The European Commission is aiming to harmonise ISAC for drone detection in the European Union using the existing mobile spectrum at 3.4-3.8 GHz and has issued a mandate for this purpose to the CEPT. Their aim is to address security concerns about hostile drones, as part of their wider plan on counter drone security. CEPT is planning to consult on a draft report with proposed harmonised technical conditions in July 2027, with a final report setting out its decision expected in March 2028.

7.23 We are considering whether this is a potential solution for the future in the UK and we would be interested to hear from stakeholders as to what their opinions on the subject are. In the meantime, we will also continue to engage with the CEPT process on ISAC and keep abreast of the progress made in its work.

Question 12: Are you interested in or do you have any plans to trial the use of ISAC for drone detection purposes?

8. Next steps

8.1 This consultation will close on 30 September 2026. Once the consultation period has closed, we will review all the responses received. We plan to publish a statement in early 2027 setting out our decisions on whether to proceed with these proposals.

8.2 If we decide to proceed with our proposals in the 450 MHz and 5030-5091 MHz bands, we plan to publish a further consultation on the draft licences.

Ad hoc drone control and drone radar licence requests during 2026/27

8.3 Because of the fast pace of innovation and change in this sector, we understand there could be demand for some of our proposed licences before we make our final decisions. We have an existing policy on ad hoc licencing requests that we summarise as:

8.4 We have a well-established process for issuing licences in response to requests for temporary access to spectrum for testing and development purposes on a **non-commercial basis**.

8.5 If there is demand for **commercial** use: once we receive ad-hoc requests for spectrum outside our existing products, we will consider the best route available (if any) to access the spectrum. As part of this process, we may need to ask for additional information including technical evidence. However, we cannot provide any assurances that access to the requested spectrum would be granted or provided.

8.6 It should be noted that requests for non-standard access may take some time to be considered due to their complex nature and may require wider consultation. We are likely to have limited resources for ad hoc requests and will need to prioritise those taking account of our broader program of work and existing commitments.

8.7 In the case of bands included in this consultation, we anticipate that any ad-hoc authorisation would likely be time limited and aimed at "bridging" the period until we make decisions.

8.8 In the case of requests for drone control bands, we would advise any applicants to obtain prior authorisation from the CAA for BVLOS flight in the proposed service area.

8.9 In any case, we would advise applicants to read our technical analysis in this document, as relevant to the band of interest, before approaching us.

Question 13: Do you have any other comments on this consultation document?

A1. Impact assessments

Impact assessment

A1.1 Section 7 of the 2003 Act requires us to carry out and publish an assessment of the likely impact of implementing a proposal which would be likely to have a significant impact on businesses or the general public, or when there is a major change in our activities.

Drone control spectrum (450 MHz and 5030–5091 MHz)

A1.2 We consider that our proposals will promote efficient use of spectrum by bringing an additional use to these bands, while being expected to have limited impact on existing users, as explained below.

Impact on the industry

A1.3 Our proposals are intended to support innovation and growth in the drone sector by enabling interim access to additional spectrum for drone control links.

A1.4 In the case of 450 MHz, availability would be mostly limited to rural and remote areas including many areas in Scotland. This is due to higher use of the band by existing business radio users especially in England and in urban areas.

A1.5 These proposals would provide greater flexibility for drone operators, support the development of new services, and allow stakeholders to deploy and scale innovative use cases while longer-term spectrum arrangements are developed. As set out in paragraphs 3.5-3.8, the proposals are expected to reduce barriers to deploying drone services where existing spectrum options may not be suitable for all operational requirements.

A1.6 We do not expect the proposals to impose additional costs on existing drone operators, as current spectrum access arrangements would remain available. Only stakeholders that consider the new authorisations beneficial would need to apply for a licence. The proposals would create some administrative costs associated with licensing and coordination, but we consider these to be proportionate and necessary to ensure efficient spectrum management.

Impact on existing users of these bands

A1.7 Our proposals for those bands include licence conditions designed to ensure there is a very low risk of harmful interference to existing users of the band, as we detail in Annexes 4 and 5 for the 450 MHz and 5030-5091 MHz bands respectively.

Drone detection radar (16 GHz and 24 GHz)

A1.8 We consider that our proposals will promote efficient use of spectrum by bringing an additional use to these bands, while having very little impact to existing users, as explained below.

Impact on the industry

A1.9 Our proposals for drone detection radar are intended to support public safety and security objectives by enabling organisations to deploy systems capable of detecting drone activity. The proposals would provide a clear authorisation framework for relevant equipment and

may help support the protection of critical infrastructure, public events, and other sensitive locations.

A1.10 Administrative costs for licensees would be limited to licence fees and compliance with licence conditions, as noted in paragraph 6.21.

Impact on existing users of these bands

A1.11 On 24 GHz, our coexistence analysis in Annex 6 shows that, under the proposed licence conditions, the probability of harmful interference to other services would be very low.

A1.12 We propose to avoid interference from 16 GHz radar to existing users via case by case analysis including coordination with the MOD and analysis of risk to RAS.

A1.13 Overall, we consider that if we proceed with our proposals the likelihood of any impact on existing users will be very low.

Impact on consumers and citizens (drone control and radar)

A1.14 Consumers and citizens may benefit from increased availability of drone-enabled services, including infrastructure inspection, delivery of goods and medical supplies, farming applications, emergency response, and public safety services, as noted in paragraph 2.8. The proposals may also contribute to wider economic growth and innovation by enabling new commercial drone deployments and supporting continued development of the UK drone sector. In addition, as outlined in paragraphs 6.1-6.3, authorising drone detection radar would be expected to help improve safety and security by supporting the detection of potentially harmful or malicious drone activity.

A1.15 There is greater availability of 450 MHz spectrum in rural and remote areas – this has the potential to bring benefits for communities in these areas, for example, this band has propagation characteristics that may be particularly useful for postal and medicine drone deliveries in remote areas.

Conclusion

A1.16 Overall, we consider that our proposals in this document can bring substantive benefits for stakeholders, including consumers and citizens, and help to promote spectrum efficiency, growth, and innovation. We consider that the technical and non-technical conditions we have set out here should ensure that there will be limited/little impact on incumbent users of the band. We consider that these conditions are proportionate to fulfil our duties to protect incumbent licensees and should not represent an excessive burden on prospective drone operators. We anticipate minimal costs for the industry and minimal impacts on existing users.

Equality impact assessment

A1.17 We have given careful consideration to whether our proposals will have a particular impact on persons sharing protected characteristics (broadly including race, age, disability, sex, sexual orientation, gender reassignment, pregnancy and maternity, marriage and civil partnership and religion or belief in the UK and also dependents and political opinion in Northern Ireland), and in particular whether they may discriminate against such persons or impact on equality of opportunity or good relations. This assessment helps us comply with

our duties under the Equality Act 2010 and the Northern Ireland Act 1998.[66] We have also had regard to the matters in Section 3(4) of the 2003 Act.

A1.18 When thinking about equality we think more broadly than persons that share protected characteristics identified in equalities legislation and think about potential impacts on various groups of persons (see paragraph 4.7 of our impact assessment guidance).

A1.19 In particular, Section 3(4) of the 2003 Act also requires us to have regard to the needs and interests of specific groups of persons when performing our duties, as appear to us to be relevant in the circumstances. These include:

- the vulnerability of children and of others whose circumstances appear to us to put them in need of special protection;
- the needs of persons with disabilities, older persons, and persons on low incomes; and
- the different interests of persons in the different parts of the UK, of the different ethnic communities within the UK and of persons living in rural and in urban areas.

A1.20 We have not identified any adverse impacts of our proposals on specific groups of persons that are likely to be affected in a different way to the general population.

A1.21 We did not identify any material impacts of our proposals on specific groups of people, although there is some potential for positive effects. There is greater availability of 450 MHz spectrum in rural and remote areas, which has the potential to bring connectivity benefits for communities in these areas – this band has propagation characteristics that may be particularly useful for postal and medicine drone deliveries in remote areas.

Welsh language impact assessment

A1.22 We are required to take Welsh language considerations into account when formulating, reviewing, or revising policies which are relevant to Wales (including proposals which are not targeted at Wales specifically but are of interest across the UK).[67]

A1.23 We do not consider our proposals have any impact on opportunities for persons to use the Welsh language or treat the Welsh language less favourably than the English language. We also do not think there are ways in which our proposals could be formulated so as to have, or increase, a positive impact, or not have adverse effects or decrease any adverse effects. This is because our proposals relate to spectrum access across the UK.

A1.24 We note that our current practice is to offer to produce spectrum licences in Welsh, and do so when requested, in accordance with our obligations set by the Welsh Language Commissioner. This would also apply to licences discussed in this document.

[66] Section 75 of the Northern Ireland Act 1998

[67] See Standards 84-89 of Hysbysiad cydymffurfio (in Welsh) and compliance notice in English. Section 7 of the Welsh Language Commissioner's Good Practice Advice Document provides further advice and information.

A2. Legal framework

A2.1 Ofcom's statutory powers and duties in relation to spectrum management are set out primarily in the 2003 Act and the WT Act.

Duties under the 2003 Act

A2.2 Our principal duties under the 2003 Act, when carrying out our functions and exercising our powers, are to further the interests of citizens and consumers, 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 We must also have regard to:

a) the desirability of promoting competition in relevant markets;
b) the desirability of encouraging investment and innovation in relevant markets;
c) the desirability of ensuring the security and availability of public electronic communications networks and services;
d) the different needs and interests, so far as the use of the electro-magnetic spectrum for wireless telegraphy is concerned, of all persons who may wish to make use of it; and
e) 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.

A2.4 In performing our duties, we are required under Section 3(3) of the 2003 Act to have regard in all cases to the principles under which regulatory activities should be transparent, accountable, proportionate, consistent, and targeted only at cases in which action is needed, and any other principles appearing to Ofcom to represent the best regulatory practice.

A2.5 In carrying out certain regulatory functions, including Ofcom's spectrum management functions, Section 4 of the 2003 Act requires Ofcom to act in accordance with the following requirements:

a) to promote competition in communications markets;
b) to promote the interests of all members of the public in the United Kingdom;
c) to act in a manner which, so far as practicable, is technology neutral;
d) to encourage, to the extent Ofcom considers it appropriate, the provision of network access and service interoperability for the purpose set out in s.4(8);
e) to encourage such compliance with certain international standards as is necessary for the purposes set out in s.4(9); and
f) to promote connectivity and access to very high capacity networks by members of the public and businesses in the United Kingdom.

Growth duty

A2.6 Section 108 of the Deregulation Act 2015 requires Ofcom to have regard to the desirability of promoting economic growth when exercising its regulatory functions. In order to consider the promotion of economic growth, Ofcom will exercise its regulatory functions in

a way that ensures that: a) regulatory action is taking only when it is needed, and b) any action taken is proportionate.

A2.7 The Government's statutory guidance on this duty recognises drivers of economic growth to include innovation and competition.[68]

UK Government's Statement of strategic priorities

A2.8 Under Section 2B(2) of the 2003 Act, when exercising our functions relating to the management of radio spectrum, we are required to have regard to the UK Government's Statement of strategic priorities (SSP) that has been designated by the Secretary of State under Section 2A(1). The current SSP was designated on 28 April 2026.

Regulatory framework under the WT Act

A2.9 In carrying out our spectrum functions we have a duty under Section 3 of the WT Act to have regard in particular to:

a) the extent to which the spectrum is available for use, or further use, for wireless telegraphy;
b) the demand for use of that spectrum for wireless telegraphy; and
c) the demand that is likely to arise in future for such use.

A2.10 We also have a duty to have regard to the desirability of promoting:

a) the efficient management and use of the spectrum for wireless telegraphy;
b) the economic and other benefits that may arise from the use of wireless telegraphy; (iii) the development of innovative services; and
c) competition in the provision of electronic communications services.

A2.11 Under Section 8(1) of the WT Act, it is unlawful to establish or use a wireless telegraphy station or install or use wireless telegraphy apparatus except under and in accordance with a wireless telegraphy licence granted under the WT Act.

Impact assessments

A2.12 Section 7 of the 2003 Act requires us to carry out and publish an assessment of the likely impact of implementing a proposal which would be likely to have a significant impact on businesses or the general public, or when there is a major change in Ofcom's activities. Impact assessments help us to understand the potential impact of our policy decisions before we made them. They also help us to explain the policy decisions we have decided to take and why we consider those decisions best fulfil our applicable duties and objectives in the least intrusive way.

A2.13 As a matter of policy, Ofcom is committed to carrying out and publishing impact assessments in relation to the great majority of our policy decisions, although the form of that assessment will depend on the particular nature of the proposal. Our impact assessment guidance sets out our general approach to how we assess and present the impact of our proposed decisions.

[68] Growth Duty Statutory Guidance

A2.14 We also have statutory obligations which require us to consider the impact on specific groups of persons when formulating policy proposals. These are:

a) our public sector equality duties under Section 149 of the Equality Act 2010 (the "Equality Act") and Section 75 of the Northern Ireland Act 1998 (the "NI Act") including potential impacts on the groups of persons identified in those sections as having protected characteristics;
b) potential impacts on the needs and interests of groups of persons identified in Section 3(4) of the 2003 Act. This includes the needs of persons with disabilities, of the elderly and of those on low incomes; and
c) where the Welsh Language Standards are engaged, potential impacts on opportunities to use Welsh and treating Welsh no less favourably than English.

A3. Coexistence analysis: drone control links in 450 MHz

Coordinating with co-channel business radio users

Our proposed approach to co-channel coordination

A3.1 Any new drone use will need to be coordinated with other business radio users given they will share the same frequencies.

A3.2 We already formally coordinate business radio technically assigned and area defined licences using our technical assignment algorithm, as explained in the TFAC. We typically grant business radio licences if the proposed use is not expected to interfere with existing licensees, based on field strength thresholds for usable service areas and potential for harmful interference.

- **Technically assigned licences** are based on deployment parameters provided by applicants, including base station location, ERP, and antenna pattern. Licensees are only permitted to use business radio equipment under the parameters set out in their licence. Some technically assigned licences support shared use, with up to three business radio licensees sharing the spectrum in a given area.
- **Area defined licences** allow a greater level of flexibility, permitting exclusive use of a designated service area (on a national or wide area regional basis down to 50 km x 50 km grid squares) provided they meet the interference field strength threshold at the edge of that area. This allows licensees to alter their deployment within that area provided they continue to meet this threshold (and other licence conditions).

A3.3 We intend to apply the approach outlined in the TFAC for coordinating drone use with business radio users as a starting point. We consider this is appropriate since the TFAC has been in place for 20 years, has enabled widespread use of the band with suitable protection from harmful interference, and because its parameters are consistent with existing 450 MHz capable drone equipment.

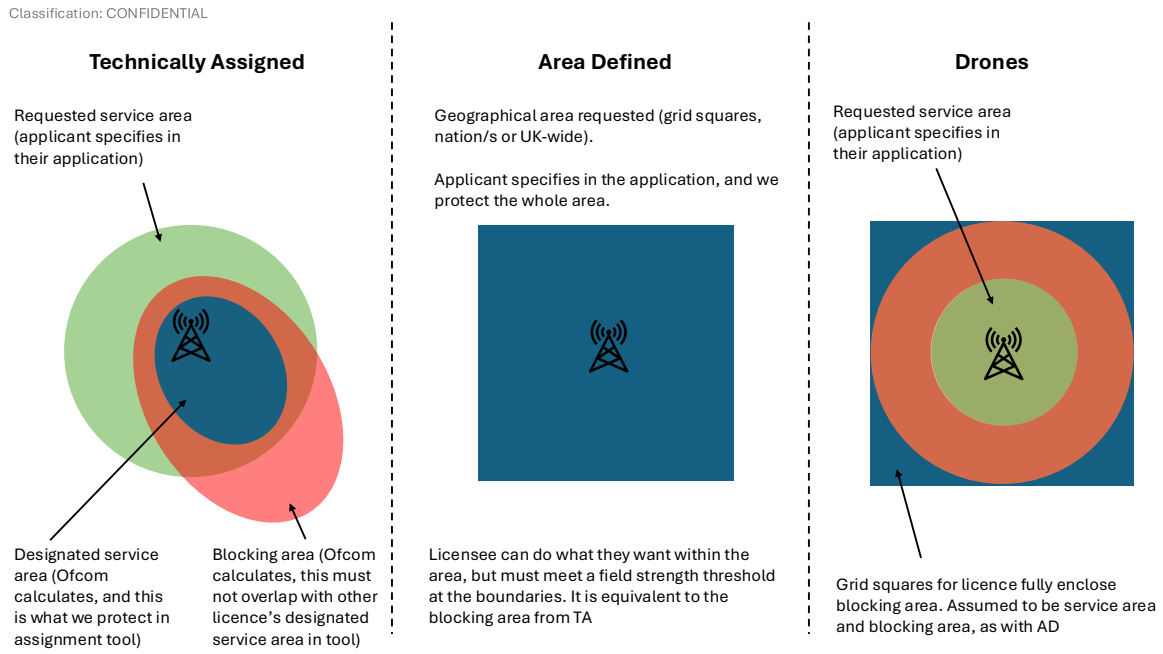
A3.4 As paragraph 4.25 explains in more detail, "service area" refers to the area in which a business radio or drone user is authorised to operate, and "blocking area" refers to the area in which a business radio or drone user could cause harmful interference to other licensees. These are illustrated in figure A3.1 below.

Proposed additional requirements for protecting co-channel business radio use

A3.5 Coexistence for business radio users is managed by ensuring that the area in which a new licensee could cause harmful interference to existing users does not overlap with the area in which any existing business radio licensees provide services.[69]

[69] For example, an existing 12.5 kHz licensee in the 450 MHz band would have a service area defined by its base station transmit ERP and antenna pattern at a field strength of 26 dBµV/m. A new business radio licence could be granted where the potential for harmful interference posed by the new licensee was sufficiently low, i.e. less than 14 dBµV/m within the existing licensee's service area.

Figure A3.1: Overview of business radio and drone service and blocking areas



A3.6 To protect business radio users from harmful interference, we propose to require geographic separation between business radio and drone users operating in the same frequencies. The signal strengths that correspond to good service and potential interference are common to all business radio equipment. However, as drones operate at higher altitudes and with greater mobility than typical business radio voice and data applications, additional mitigation is required to manage these interference risks.

A3.7 For 450 MHz drone use, we propose to calculate the blocking area based on the combined field strength of the base station and mobile stations (drones) at the north, west, east and southmost positions of the drone licensee's requested service area to a receiver height of 15m AGL.[70] The resulting blocking area will cover a larger area than for other business radio users to provide the geographical separation we consider to be necessary between business radio and drone users.[71] The grid squares we propose to include in the 450 MHz drone licence will fully encompass this blocking area.

A3.8 We assess the risk of harmful interference to business radio users with antenna heights of greater than 15m AGL to be low (around two thirds of business radio licensees operate with antenna heights below 15m AGL). The grid squares defined in the 450 MHz drone licence, based on area defined business radio units of 50 km x 50 km, will typically already be larger than the calculated blocking area for drones. We consider this will provide further

[70] For these calculations, we propose to calculate the blocking area using propagation model ITU-R P.452-18 instead of the default ITU-R P.1546-4, to a height of 15m AGL instead of the default 2m AGL under the TFAC. We note that the TFAC the blocking area calculation is based only on the base station. We consider that ITU-R P.452-18 better accounts for the height of the drones than ITU-R P.1546-4.

[71] ITU-R P.452-18 is reciprocal, i.e. the path loss is the same for a given path regardless of which direction the path loss is calculated. Our approach therefore ensures protection of both business radio and drones.

geographical separation from other licensees and additional protection for higher antennas.[72]

Proposed additional requirements for protecting co-channel drones

A3.9 We also consider that there is a greater risk of harmful interference between co-channel drone systems than for typical business radio systems. This is because they operate at higher altitudes, which creates a greater line-of-sight risk between drones than for other band users. Consistent with our approach to protect existing business radio users, co-channel drone users will also need to be geographically separated from each other.

A3.10 Therefore, to account for drone operating heights AGL[73], we are proposing that our coordination process should not permit a new drone applicant's blocking area to overlap with an existing drone licensee's service area when operating in the same frequencies.

Coordinating with adjacent channel users

Our proposed approach to adjacent channel coordination

A3.11 Any proposed drone use must also be able to coexist with other 450 MHz band users: adjacent business radio users, and other non-business radio users (i.e. emergency services, PMSE, scanning telemetry, maritime and licence exempt SRDs).

A3.12 For the reasons explained above, we also propose to apply our approach under the TFAC to protect adjacent users, requiring drone users to meet the existing OOBE limits[74] as well as updated ERP limits (10W for mobile stations). Other adjacent channel users either side of the 450 MHz band (i.e. satellite, MOD (Fylingdales radar), and DTT) are more spectrally distant from the channels proposed for drone use than PMSE and emergency services. We therefore consider that our proposals to protect immediately adjacent non-business radio users will also be sufficient to protect these users. Additionally, the CAA, with the support of NATS, enforces a permanent UAS restriction zone for drones in the vicinity of the Fylingdales radar which we consider will provide additional protection.

Protecting adjacent business radio users

A3.13 To coordinate immediately adjacent channel business radio users with varying use characteristics, the TFAC requires a proximity check within 250 metres of the requested

[72] A potential additional mitigation for this risk is to limit drone use to TDD systems and assign them the base transmit frequency in a duplex pair, i.e. the same frequency as mobile stations receive rather than the base stations. Mobile stations of business radio licences typically operate at heights of less than 15m AGL, minimising the risk of harmful interference.

[73] For example, a drone already authorised at 100m AGL would have a given service area. For a licence to be awarded, a new applicant wanting to operate a drone at 50m AGL would need to ensure that its blocking area, calculated at its own maximum operational height of 50m AGL to a receiver height of 100m AGL, did not overlap with the service area of the already authorised drone. As with co-channel business radio users, the contour would be calculated using ITU-R P.452-18.

[74] For most 12.5 kHz deployments, this equates to a maximum base station ERP of 50W, a maximum mobile station ERP of 25W, and 60 dBc suppression in the adjacent and alternate channels. Beyond the adjacent and alternate channel, a limit of -36 dBm is required, with the measurement bandwidth dependent on the separation from the centre frequency.

base station location for technically assigned licences only. Where an existing adjacent channel technically assigned user is operating within 250 metres of a new business radio licensee's requested technically assigned location, we would not authorise that particular frequency. No proximity check is made between area defined licences, or between area defined and technical assigned licences.[75] This 'light touch' adjacent channel coexistence measure has allowed dense deployment of business radio equipment with an acceptable interference environment.

A3.14 The higher operating altitudes for drones could potentially increase the risk of harmful interference to other users, for example because there could be a greater risk of LoS between a drone and another user.

A3.15 We considered whether additional coexistence measures would be required to protect adjacent channel business radio users, for example conducting a proximity check when issuing a drone licence. We consider that when the combined proposed additional requirements for drones to protect other users are taken into account, the risk of harmful interference is low enough that our current approach will be sufficient to manage adjacent channel coexistence. We intend to keep this under review however, pending evidence we gather as drone deployments grow.

A3.16 We have proposed an ERP limit of 10W for drone mobile stations, compared to the maximum 25W ERP we allow for mobile stations for typical business radio users. This is a 4dB reduction (and is 7dB below the maximum we allow for base stations for business radio), which we consider reduces interference risks.

A3.17 Drones will be mobile and therefore the proportion of time they spend near to any particular adjacent channel business radio user will be small. Similarly, we note that current drone deployments in the 450 MHz band use a TDD-like system whereby drones only transmit for some of the time, which further reduces the risk of harmful interference.

A3.18 As discussed in Section 4, with greater spectrum availability of the 450 MHz band for drones in Wales, Northern Ireland, and Scotland, many of the use cases are likely to be in rural and remote parts of the UK which have less intensive use by business radio. Therefore, we consider the risk of a drone operating in close proximity to an adjacent channel business radio user to be reduced. BVLOS drone use is also currently subject to an operational authorisation (OA) being issued by the CAA.[76] This OA requirement will limit the operational areas and density of drone deployments in the near term, further reducing the risks of harmful interference to adjacent channel business radio users during the initial phase of proposed 450 MHz drone licensing.

Proposed additional requirements for protecting adjacent non-business radio users

A3.19 Currently, business radio use in the 450 MHz band does not explicitly coordinate with the other adjacent non-business radio users (emergency services, PMSE, scanning telemetry, maritime and licence exempt SRDs). However, due to the increased risks of harmful interference from operating at altitude (compared to typical business radio equipment), we considered whether drones will need to coordinate with other adjacent users.

[75] This is because area defined licences do not specify base station locations.
[76] Issuing an OA is dependent on the CAA's assessment of the ground risk, air risk, and containment.

A3.20 It is not feasible to manage coexistence of these users through geographical separation, given we do not currently license or manage all of these assignments.[77] We therefore propose to adopt a mid-packing policy[78] in the 450 MHz band to ensure that there is frequency separation between drones and adjacent non-business radio use.

A3.21 We consider a frequency separation of two channels (25 kHz) is reasonable and proportionate for proposed drone use in the UK. We determined this separation using a minimum coupling loss calculation using free space path loss as set out in table A3.1 below.

A3.22 As the parameters associated with emergency services use are not in the public domain, our calculation uses values consistent with PMSE use of this band. We have assumed PMSE operational bandwidth of 12.5 kHz and a noise figure of 6dB, consistent with the parameters in our PMSE Interface Requirement 2038 for talkback equipment operating under ETSI EN 300 086. We also assumed that an I/N of -6dB is required to protect PMSE equipment.

Table A3.1: Drone to non-business radio user adjacent channel minimum coupling loss calculations

Parameter	Number of channels separation	
	0	2
Frequency separation from drone centre frequency (kHz)	6.25	31.25
Drone ERP (dBm)	40	40
OOBE suppression (dBc)	60	69
Effective ERP (dBm)	-20	-29
PMSE noise (dBm)	-127	-127
I/N (dB)	-6	-6
Maximum interference (dBm)	-133	-133
Required path loss (dB)	113	104
Distance under FSPL (km)	25	8

A3.23 We consider this should ensure that OOBE levels from drone users are likely to be similar to, or below, those of typical business radio users operating at narrower frequency separations.

International coordination

A3.24 Some parts of the UK share or are close to international borders, which typically requires coordination to protect users in either country from harmful interference. We coordinate

[77] For example, some emergency services use is not made available for public security and safety reasons.
[78] This means we would prioritise assigning channels for drone use in the middle of the business radio frequency blocks as far as practicable to ensure a minimum spectral separation of 25 kHz.

use of the 450 MHz band with neighbouring countries under the HCM Agreement[79], and through a general Memorandum of Understanding with the Republic of Ireland.

A3.25 To ensure that any proposed drone use does not adversely affect users in the 450 MHz band in other countries, our proposed approach to international coordination is as follows:

- For business radio, the HCM agreement uses technical parameters such as effective radiated power (ERP), antenna height, and antenna directivity, to determine whether a coordination field strength threshold has been exceeded. Our existing business radio assignment tool already calculates this, thereby identifying where international coordination may be necessary.
- For drones, higher operating altitude and resulting wider coverage areas could potentially increase the likelihood of signals crossing borders into neighbouring countries. To address this, we propose to conduct the field strength calculations using both the drone and base station parameters, and to coordinate with other countries if either set of parameters exceeds the field strength threshold. We will continue to coordinate the new assignments of other countries as we currently do to ensure that any new drone users are sufficiently protected.
- We note that the HCM Agreement applies to land and fixed mobile use, rather than aeronautical use. Deployments would be coordinated on a case by case basis, and we will work with affected countries to ensure that any proposed drone use does not cause harmful interference to international users of the band.

[79] The HCM (harmonised calculation method) Agreement is a multilateral European framework that manages spectrum coordination in border areas to prevent harmful radio interference. Although the UK is not a signatory to the HCM Agreement, in the absence of a formal international agreement we apply its coordination procedure and technical framework to facilitate international coordination in the 450 MHz band.

A4. Spectrum availability analysis: 450 MHz band

Calculating the required grid squares

A4.1 In support of our work looking at coexistence between drones and other users, we have also considered the spectrum that is likely to be available for drone use. This section details how we have undertaken the analysis.

A4.2 We have considered a representative drone deployment in our calculations. We have assumed a base station operating at 50W ERP using an omnidirectional antenna at 15m AGL and several drone stations operating at 10W ERP, using an omnidirectional antenna at 100m AGL.

A4.3 We have calculated the blocking area using ITU-R P.452-18, taking the combined area of the base station and drone stations at the north, east, west, and southmost positions in a circular 10 km service area. The blocking area is calculated to a field strength value of 14dBµV/m, consistent with the TFAC, to a height of 15m AGL.

A4.4 The blocking area calculation above depends on the exact locations of the base and drone stations, as the terrain height will vary between different locations. We have calculated the area required based on several different locations. The main contiguous area typically extends to approximately 100 km from the central base station. There are some small islands of coverage outside of the main area, but we consider that careful planning of the drone deployment and considering the actual operational characteristics, would ensure that the coverage does not extend unnecessarily beyond this area.

A4.5 Sixteen grid squares would typically be required to accommodate a 100 km blocking area, noting that each grid square is 50 km x 50 km.

Overlap with other licences

A4.6 In accordance with the TFAC, a new business radio licence would only be assigned if the blocking area did not overlap with the service area of an existing co-channel licence. For technically assigned business radio licences, this would be the service area calculated during the assignment process. For area defined business radio licences, this would be the grid squares included in the licence.

A4.7 The service area for each technically assigned licence is a complex shape determined by calculating the field strength contour of the licence parameters. The service areas of existing licences vary considerably. For simplicity, and to ensure that our analysis is representative of the wide range of current deployments, we have assumed a conservative value of 50 km for the service radius for each technically assigned licence.

A4.8 To determine whether there is location overlap between the representative drone deployment and each business radio technically assigned licence, we have calculated the separation distance between the two base station locations. As the representative drone deployment is represented by a square area, the distance from its centre to the edge varies by direction. We have therefore adjusted the required separation distances to technically assigned licences to reflect this.

A4.9 We define frequency overlap as any portion of the new licence's operational bandwidth overlapping with any portion of another existing licence. This includes licences operating on the same frequencies, and licences where only a portion of the frequencies overlap.

Available channels

A4.10 We have considered the full set of licence data as of March 2026 in our analysis. To provide an output that is easier to interpret, we have considered the frequencies that might be available assuming a deployment at the centre of each 100 km x 100 km grid square across the entire UK.

A4.11 At each location, we check each available frequency within the business radio frequency plan for licences that meet both the location and overlap conditions (as defined above) at the location considered. If there is any licence that meets both conditions, i.e. a location overlap and a frequency overlap, we assume the frequency would not be assigned. The remaining list of channels we consider to be potentially available to a representative drone deployment in that location.

A4.12 We then take the list of all available business radio channels in the 450 MHz band, and discount any that are reserved for other purposes or that do not meet the frequency separation conditions we have proposed. To identify available channels for drones, we have counted the total number of simplex channels and duplex pairs that remain.

A4.13 Our spectrum availability results are shown in the maps in figure 4.2.

A5. Coexistence analysis: drone control links in 5030-5091 MHz

Coexistence with other services

A5.1 Alongside considering how drone control links could be authorised within the 5030-5091 MHz band, we have also considered the possibility for links to coexist with other co- and adjacent channel users of the band. In this section, we set out our initial views on how drone use could coexist with the other services in the band.

A5.2 Other co-channel users include ARNS aids (5000-5250 MHz), military (5000-5850 MHz), the radiodetermination service (4.5-7 GHz, including TLPR, AM(R)S and AMS(R)S (5000-5150 MHz). Drone use would operate under the AM(R)S and AMS(R)S allocations.[80]

A5.3 Users of adjacent frequency bands include radio astronomy (below 5 GHz), RNSS (5000-5030 MHz), FSS (5091-5150 MHz), AMS (5091-5150 MHz), radar level gauges (above 5.15 GHz), and WAS (above 5.15 GHz).[81]

Co-channel services

Microwave landing systems (MLS)

A5.4 The ARNS allocation at 5000-5250 MHz was intended for use by microwave landing systems (MLS). MLS was designed as a precision approach system for use at larger airports to assist aircraft landing, particularly in adverse weather conditions. It was intended to replace or supplement older instrument landing systems (ILS), but in practice did not see widespread deployment within the UK or in Europe.

A5.5 As per footnote 5.444 of the Radio Regulations, the requirements of MLS in 5030-5091 MHz have priority over other uses of this frequency band. We note that there were some early deployments of MLS in the UK, particularly at London Heathrow, but that these deployments are no longer operational. Similarly, we note that aircraft registered within the UK are typically not fitted with MLS-capable equipment.

A5.6 We therefore consider that the requirements of footnote 5.444 are not relevant to any proposed drone control link use in practice, and that compatibility with MLS systems is not an issue for UK deployments of drone control links in this band.

Radiodetermination service

A5.7 TLPR operates under the radiodetermination allocation. TLPR in the UK operates under the short-range devices Interface Requirement 2030. TLPR systems operate within closed tanks

[80] Compatibility studies to support the allocation to allow use of the band for drone control links were completed in preparation for WRC-12. The results of these studies are set out in ITU-R M.2205 (these studies mainly considered the satellite element, which we are not considering at the current time).
[81] Note that use of the spectrum by WAS is on a licence exempt basis, and therefore operates on a non-interference, non-protection basis.

which, as per the Interface Requirement, must be made of materials providing equivalent level of attenuation to metal or reinforced concrete.

A5.8 We consider that drone use would be unlikely to interfere with these users, given the attenuation from the tank material. We therefore consider that no coordination between drone use and TLPR is necessary.

Adjacent frequency services

A5.9 Several services operate in the frequencies adjacent to those we are considering for use by drone control links. We are proposing to authorise only a central part of the band so that the frequency separation for adjacent users will be typically greater than 10 MHz.

A5.10 We consider that this frequency separation is necessary until the interference environment between drones and other services is better understood.

Radio navigation satellite service

A5.11 The RNSS allocation at 5000-5030 MHz is used by a number of position, navigation, and time (PNT) providers such as Galileo, GPS, and QZSS. ITU-R M.2219 sets out the spectrum use of several satellite systems in this range. The spectrum at 5000-5010 MHz is typically used for satellite uplinks, while 5010-5030 MHz is typically used for downlink to users.

A5.12 Footnote 5.443C requires that any use of the AM(S)R allocation be limited to protect RNSS system downlinks in the adjacent 5010-5030 MHz band. The footnote requires that, until such time as an appropriate value is established in a relevant ITU-R Recommendation, the EIRP density limit of −75 dBW/MHz in the frequency band 5010-5030 MHz for any AM(R)S station unwanted emission should be used.

A5.13 Any drone use of the band would need to comply with this limit to ensure protection of adjacent RNSS users. Given the ongoing standardisation process for the band, we will continue to review whether additional mitigation measures are required.

Radio astronomy service

A5.14 As set out in the UK frequency allocation table (UKFAT), there are a number of radio astronomy uses in the UK around which any drone control link use would need to coordinate.[82] These are shown in table A5.1.

Table A5.1: Radio astronomy use in 4.8-5 GHz in the UK

Frequency band	Use	Sites
4600 – 4825 MHz	Cosmic microwave studies and MERLIN measurements	Cambridge, Darnhall, Defford, Jodrell Bank, Knockin, Pickmere
4950 – 4990 MHz	Cosmic microwave studies	Cambridge, Darnhall, Defford, Jodrell Bank, Knockin, Pickmere
4990 – 5000 MHz	Mapping radio sources and pulsars	Cambridge, Darnhall, Defford, Jodrell Bank, Knockin, Pickmere and Chilbolton (without protection).

[82] Ofcom Space science and meteorology spectrum allocations in the UK - *Ofcom*

A5.15 The ITU Radio Regulations do not set out explicit requirements to protect radio astronomy by any use of AM(R)S allocation. However, we note that footnote 5.443C above sets out an EIRP density limit to protect adjacent RNSS use. Radio astronomy operates at greater spectral separation from the proposed drone use and therefore would likely see reduced emissions in practice.

A5.16 Coexistence with radio astronomy stations is typically achieved by geographical and/or frequency separation. Based on the protection criteria set out in ITU-R RAS.769-2, we note that relatively short protection distances (e.g. less than 1 km) would be sufficient to protect radio astronomy sites assuming the EIRP density limit required in footnote 5.443C and a radio astronomy antenna gain of 0 dBi consistent with high off-boresight angles, for example as would exist to ground stations of drone systems.[83]

A5.17 For drone stations, the off-boresight angle could be smaller due to the increased operational altitude.[84] For example, a radio astronomy antenna pointing directly upwards would see an off-boresight angle of approximately 10 degrees for a drone operating at a height of 6 km AGL at 1 km horizontal separation.[85] If the radio astronomy antenna were to point at lower elevation angles, a lower off-boresight angle may be observed, increasing the potential for harmful interference. We note that radio astronomy antennas are typically narrow beamwidth to better reject harmful interference, but we consider that the risk would need to be mitigated through the use of exclusion zones.

A5.18 Our initial proposal for drone use is approximately 40 MHz away from radio astronomy use such that the risk is likely to be reduced in practice. However, we welcome input on the realistic out of band emissions that drone systems can achieve and how these systems might be used in practice to better understand the risk.

Aeronautical mobile service

A5.19 As per footnote 5.444B, aeronautical mobile use of 5091-5150 MHz is limited to:

- Systems operating in the aeronautical mobile (R) service and in accordance with international aeronautical standards, limited to surface applications at airports. Such use shall be in accordance with Resolution 748 (Rev.WRC-19);
- Aeronautical telemetry transmissions from aircraft stations in accordance with Resolution 418 (Rev.WRC-19). (WRC-19)

A5.20 AM(R)S surface use at airports includes systems like MLS and AeroMACS, with characteristics set out as in ITU-R M.1827-1. As noted previously, MLS is not in operational use in the UK, and therefore drone use would not need to coordinate with any UK deployment of MLS.

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[83] By off-boresight angle, we mean the angle away from the radio astronomy antenna main beam axis at which the interfering transmission would arrive; ITU-R RAS.769-2 sets out a single dish protection threshold of -207 dBW/Hz at 4995 MHz. IMT-R M.[AM(R)S_AMS(R)S_CHAR_5GHZ] defines a typical drone ground station height of 10m AGL. Based on a maximum EIRP density of -75 dBW/MHz (-135 dBW/Hz), a path loss of 72 dB would be required to meet the protection threshold. This equates to a separation distance of less than 0.1 km under free space path loss.

[84] ITU-R SA.509-3 defines a reference antenna used in the threshold calculations in ITU-R RAS.769-2. The reference antenna pattern shows 0dBi antenna gain at approximately 19.05° off boresight from the radio astronomy antenna. Off-boresight angles of less than 19.05° are likely to require greater separation distances.

[85] The typical operational height listed within IMT-R M.[AM(R)S_AMS(R)S_CHAR_5GHZ] is 6 km.

A5.21 For systems such as AeroMACS, we note that there are no current licences issued in 5 GHz for such use. However, we anticipate that deployment of these types of systems could be expected in future. We therefore will continue to monitor deployment of these systems and consider that drone use will need to work around such systems, for example maintaining some level of geographical separation from airports that have deployed these systems.

A5.22 Aircraft telemetry transmissions in 5091-5150 MHz are to operate as per Resolution 418 (WRC-12), which sets out the approach to ensure protection of FSS, mobile service and AM(R)S. We understand that there is some localised use of this allocation and therefore consider that any drone use would need to coordinate with these other services.

A5.23 Given that we are initially considering drone use of the central part of 5030-5091 MHz, we consider that the spectral separation will provide a level of protection to the adjacent AMS and AM(R)S use. However, we welcome input on how coexistence could be ensured if we open the band more widely.

Fixed satellite service

A5.24 FSS use of the 5091-5150 MHz band is limited to feeder links to NGSOs operating in the mobile satellite service, as per footnote 5.444A.

A5.25 Following WRC-07, any use of the band by feeder links under the FSS allocation was to be made in accordance with Resolution 114 (Rev. WRC-03). WRC-07 also set out an intention to not grant any new assignments following 1 January 2016 and to alter the FSS allocation to become secondary to MLS from 1 January 2018 onwards. WRC-15 updated this approach, requiring instead that feeder links within a certain distance of MLS use, calculated as per ITU-R Rec. S.1342, must be coordinated under 9.11.

A5.26 We note that there are no active licences operating under FSS in the UK in 5091-5150 MHz. We therefore consider that, while licences may be awarded to FSS systems in future, drone use currently would not need to coordinate with any such deployments in the UK.

A5.27 Given that we are initially considering drone use of the central part of 5030-5091 MHz, we consider that the spectral separation will provide a level of protection to any future FSS use. However, we welcome input on how coexistence could be ensured if we open the band more widely.

A6. Coexistence analysis: drone detection radars in 24 GHz

A6.1 In support of our proposal to make the 24 GHz band (24.05-24.25 GHz) available for use by drone detection radar systems, we have undertaken analysis to assess the likely coexistence of these systems with other incumbent users in the band, in particular speed cameras (24.05-24.15 GHz), level crossing radar (24.1-24.35 GHz), radio astronomy (23.6-24 GHz) and EESS (23.6-24 GHz).

A6.2 We are not aware of any use of the band by PMSE and note that our 2023 Statement on Enabling mmWave spectrum for new uses gave notice of our intention to close the band to PMSE use in the coming five years. We are also not aware of widespread use of the band by automotive short-range radar as manufacturers tend to favour higher frequency bands such as the 76 GHz band. We set out our intention to close the 24 GHz band to new authorisation for automotive short-range radar in our 2022 Statement on SRDs and implemented this in 2023.

A6.3 We are not aware of any amateur use in the band and note that the co-channel allocations 24.05-24.25 GHz allocations are secondary. We do not expect deployment of drone detection radar systems to be widespread and therefore consider that the risk of harmful interference to the adjacent primary allocation (24-24.05 GHz) is minimal.

A6.4 The remaining sections set out our analysis for coexistence with EESS, RAS, speed cameras, and level crossing radar.

Earth exploration satellite service

A6.5 One of the main activities of the EESS (passive) is to provide information for studies of climate change and weather forecasting/warnings for national and global applications.

A6.6 EESS (passive) frequency bands are determined by physics which means that, unlike some other radio uses, there is little choice about the frequencies used. Measurements in numerous different frequency bands are needed collectively to inform climate studies and weather forecasting; and continuity of observations is essential over a long timescale.

A6.7 The EESS (passive) operating at 24 GHz is used to measure sea and land surface temperature and the water vapour content of the atmosphere. This band is important as it coincides with an important water absorption line, and by measuring close to this line, information on water vapour in the atmosphere can be gained. This information is used, in particular, for weather prediction and climate change modelling. The sensors on these satellites need to collect natural radiation at very low power levels which means that they are very sensitive and may be susceptible to out-of-band emissions from the 24 GHz band.

Calculating the aggregate limits

A6.8 WRC-19 agreed out of band emission limits for IMT deployments in the 24 GHz band to ensure protection of EESS operating in 23.6-24 GHz. In the work to support our mmWave consultation, we conducted calculations to determine whether additional deployment conditions might be needed in addition to the harmonised technical conditions.

A6.9 In our final decision set out in the mmWave statement, we decided not to permit widespread deployment of IMT systems in the lower part of the 24 GHz band. However, we consider that the analysis conducted is a useful starting point to ensure protection of EESS alongside deployment of drone detection radar systems.

A6.10 Our IMT analysis took the following steps to derive a formula for the combined number of base stations using the initial and final OOB emission limits that could be deployed in a 300 km^2 area without breaching the sensor protection criteria:

- We started with the latest available satellite sensor protection requirements (we used the parameters in Recommendation ITU-R RS.1861 for the F8 sensor, which is currently the most sensitive sensor[86] and the performance and interference criteria are taken from Recommendation ITU-R RS.2017).
- We converted the number of base stations that was used in the studies for WRC-19 from the 306 km^2 F8 sensor field of view to a round number of 300 km^2.
- We then determined the contribution from multiple 200 MHz channels to the OOB emissions seen by the EESS sensor, taking account of how much the emissions drop with every 200 MHz increase in frequency separation.
- We then calculated the aggregate interference threshold (the sum of emissions from all base stations) in this 300 km^2 area for a single 200 MHz channel, taking account of manufacturing margin.
- We then calculated the equivalent aggregate interference threshold for other channel sizes from 50 MHz to 800 MHz. The aggregate interference threshold for a 50 MHz channel was -15.2 dBW/200 MHz.

A6.11 A widespread IMT deployment would be more likely to cause harmful interference to EESS than the localised drone detection radar deployments we anticipate. We therefore consider that the limits calculated for IMT deployment present an envelope within which drone detection radar systems could operate with minimal risk of harmful interference to EESS.

A6.12 To calculate a similar maximum deployment density for drone detection radar systems, we have added a 3 dB apportionment factor to the IMT-derived limit to account for other services using the spectrum. In the mmWave statement, we also included an additional apportionment factor for MOD use of the band of –25 dBW/200 MHz.

Drone detection radar

A6.13 The currently available drone detection radar systems typically operate on one of three channels within 24.05-24.25 GHz, with a bandwidth of approximately 50 MHz. Based on a 50 MHz bandwidth, the boundary between the OOB and spurious domains is approximately 125 MHz away from the channel centre frequency.[87]

A6.14 Depending on the operational channel for a given radar system, it may fall into either the OOB or spurious domain with respect to the EESS use. Channel centres above 24.125 GHz will be in the spurious domain towards EESS, while channel centres below 24.125 GHz will be in the OOB domain.

[86] This is because the F3 sensor – which was used in the WRC-19 studies – is no longer going to be deployed.
[87] The relevant standard under which these systems operate, EN 303 440, defines the OOB/spurious boundary as 2.5x the channel width away from the centre frequency.

A6.15 We anticipate that radar systems will plan channel usage to avoid harmful interference between nearby or adjacent deployments. Therefore, we consider that the most likely deployment of radar systems will be an even spread between the three operational channels. Therefore, approximately one third of deployments will be on the lowest channel and be in the OOB domain towards radio astronomy and EESS. Two thirds of deployments will use the higher channel and be in the spurious domain towards radio astronomy and EESS.

A6.16 To model this, we have calculated the average level between one OOB and two spurious channels to be -49.5 dBW/MHz. We use this value in calculating the maximum deployment density to protect EESS.

A6.17 The IMT-derived limits are based on a total radiated power (TRP), whereas the radar limits are defined relative to EIRP. Assuming losses are negligible, the TRP is equal to the EIRP less the antenna gain. The currently available drone detection radar systems are typically high gain (approximately 20 dBi). We have used this value to convert the OOB/spurious emissions value into TRP.

Calculating the maximum deployment density

A6.18 We convert the average drone detection radar OOB/spurious level of -49.5 dBW/MHz to a 200 MHz reference bandwidth, giving -26.5 dBW/200 MHz. Expressed in TRP, this is - 46.5 dBW/200 MHz. We then alter the aggregate threshold level by the MOD allowance of -25 dBW/200 MHz, as well as the additional apportionment factor of 3 dB. This gives a modified aggregate threshold of -18.68 dBW/200 MHz.

A6.19 We then calculate the number of drone detection radar deployments that would be permitted before reaching this aggregate threshold, approximately 630 drone detection radar systems within the 300 km^2 footprint. This represents a deployment density of more than 2 radar systems per square kilometre, which is far greater than we anticipate given the current demand for these systems. Additionally, the currently available radar systems have a range of several kilometres. We therefore expect the separation between radar deployments is likely to be greater than this.

A6.20 We therefore consider that, because the deployment density we anticipate is much lower than the maximum, we do not need to impose a strict limit on deployment at the current time.

Radio astronomy

A6.21 Radio astronomy is used to study the naturally occurring radio emissions from stars, galaxies, and other objects in the universe. Radio astronomy frequencies are largely governed by the physical characteristics of the extraterrestrial radiations and fundamental physical constants, which means that radio astronomers have little choice about the frequencies they use.

A6.22 In the 24 GHz band, measurements taken by the radio astronomy receivers are important for a range of scientific questions such as ammonia (NH3) line studies, whose distribution in the galaxy is used in studies on interstellar chemistry. The measurements made at 24

GHz cover six radio astronomy sites that operate as a radio telescope array called the eMERLIN network.[88]

A6.23 Radio astronomy research using e-MERLIN makes observations across a wide range of frequencies helping to answer many important scientific questions regarding the universe, including how galaxies and planets evolve.

A6.24 e-MERLIN is a key component of the global network of radio astronomy facilities (VLBI[89]) and complementary to the capability of the Square Kilometre Array[90] in which the UK is investing around £300M over the next 10 years. The operation of e-MERLIN will contribute towards how the SKA works and delivers science.

A6.25 Coexistence with radio astronomy stations is typically achieved by geographical and/or frequency separation. We use the term 'impact zone' to refer to the area in which harmful interference could be caused to a radio astronomy site if a drone detection radar were deployed.

Modelling the radio astronomy stations

A6.26 Table A6.1 sets out the location and antenna height of the individual radio astronomy stations that we have considered.

Table A6.1: Radio astronomy site locations in the UK

Observatory	Antenna height (m)	Easting	Northing
Cambridge (CA)	32	539423	254028
Darnhall (DA)	25	364278	362263
Defford (DE)	25	390201	244700
Jodrell Bank (JB) Mark II telescope	20	379817	370806
Knockin	25	332854	321877
Pickmere	25	370407	376953

A6.27 The antenna gain of the radio astronomy station towards the horizon is assumed to be 0 dBi, which is consistent with Recommendation ITU-R RA.769-2 on protection criteria for radio astronomical measurements. We have also taken account of technical parameters relevant to the protection criteria for the e-MERLIN network, for example, local terrain.

A6.28 The e-MERLIN protection criteria (-168 dBW/250 kHz) is unique to the UK's network and has been agreed with the UK's Science and Technology Facilities Council.

[88] e-MERLIN is the UK's national interferometer radio telescope array operated by Jodrell Bank. for the Science and Technology Council (STFC). STFC funds radio astronomy research in the UK, and is part of UKRI (UK Research and Innovation) a non-departmental public body sponsored by DSIT.
[89] Very long baseline interferometer
[90] The Square Kilometre Array (SKA) is a jointly funded intergovernmental project to build the world's most powerful radio astronomy facilities in Australia and South Africa with headquarters in the UK.

Modelling the impact zone

A6.29 We have modelled the out of band and spurious emissions from the drone detection radar systems into each of the six radio astronomy sites, considering local terrain and clutter.[91] The OOB and spurious emission limits we have defined have a different reference bandwidth to the protection criteria for radio astronomy, therefore we have calculated the amount of OOB/spurious emissions that will appear within the radio astronomy bandwidth when determining the impact zone.

A6.30 We calculate the impact zone by first determining the signal propagation loss that would be needed to make the OOB/spurious emissions from the base station drop below the protection criterion at the radio astronomy station. Then we use the propagation model in ITU-R P.452-18 with the local terrain profile and clutter around the radio astronomy station to convert the signal propagation loss into a separation distance.[92] The terrain profile that we use has a resolution of 50m to capture the propagation characteristics and clutter along the path.

A6.31 Drone detection radar emissions could cause harmful interference when located very close to the radio astronomy sites, which we refer to as the 'impact zone.' The impact zone for drone detection radar channels operating in the OOB domain is typically 0.7 km for each of the radio astronomy sites. For drone detection radar channels operating in the spurious domain, this reduces to typically 0.1 km.

A6.32 The impact area around each radio astronomy station is nearly a circular shape which indicates that it is not heavily influenced by geographical shielding. Given that the likely deployment of drone detection radar systems will be in sensitive locations or in high profile events, we consider that it is unlikely that systems will be deployed close to the radio astronomy sites which are typically relatively isolated from built up areas.[93] If a system is to be deployed within the vicinity of a radio astronomy site, we consider that coordination between the radio astronomy site and drone detection radar users is likely to be most effective in protecting radio astronomy, for example through agreeing on the drone detection radar channels to be deployed, deployment locations and azimuth.

Speed cameras

A6.33 Speed cameras are radar systems used to determine the speed of a passing vehicle by measuring the reflection of a transmitted radio signal. The systems are widely deployed across the UK road network and must meet technical requirements laid down by the Home Office. Given the importance and widespread deployment of speed cameras in this band, it is crucial that any drone detection radar deployment does not compromise the use of the band by these speed cameras.

A6.34 Speed cameras in this band are designed to operate reliably in a variety of environmental conditions, as set out in the Home Office's Speedmeter, traffic light and prohibited lane enforcement camera handbook. The systems are designed to be robust to interference

[91] We are proposing a licence condition of OOBE of -45dBW/MHz. Some of the higher frequency drone detection radar transmissions will be in the spurious domain towards radio astronomy, therefore we have considered a spurious level of -60dBW/MHz, aligned with ETSI EN 303 440.
[92] We assume 50% time for the calculation, and a drone detection radar height of 50m AGL.
[93] Visual inspection of the areas surrounding each of the six radio astronomy sites finds that the impact zones for both OOB and spurious emissions typically do not extend far beyond the site boundaries or access track.

from a number of co- and adjacent channel interferers. We consider that the robust design of speed cameras, alongside several additional mitigations laid out below, contribute to a low risk of harmful interference.

A6.35 Speed camera systems are typically narrow-beam systems, focusing energy on the carriageway to maximise detection probability for passing vehicles.[94] Drone detection radar systems in 24 GHz are typically phased array systems that also use highly directional beams.[95] We consider that the narrow beams used by both DDR and speed cameras minimise the risk of direct beam coupling. The deployment locations of drone detection radar systems and speed cameras are likely to be different, for example speed cameras will be deployed directed towards the carriageway, while drone detection radar systems will be deployed to have a good view of the sky. We consider that this further contributes to coexistence of the two systems.

A6.36 We note that main beam coupling is unlikely given the operational parameters and likely deployment locations of speed cameras and drone detection radar systems. We have undertaken measurements at our Baldock site to assess the interference risk when speed cameras and drone detection radar systems operate in close proximity, and with the possibility of main beam coupling.

A6.37 In our measurements, we set up representative deployments of several models of speed cameras and drone detection radar systems.

A6.38 We measured four different scenarios including a 'regular' setup and several setups intended to maximise the probability of observing harmful interference. Under the 'regular' setup, the drone radar was mounted at a height of approximately 10 m above ground level (AGL) and the speed camera was stationed 140.6 m away from the drone radar. A vehicle was then driven at several constant speeds away and towards the speed camera, while an independent handheld LIDAR speed gun was also operated to provide a reference speed level. We tested the three possible operational channels of the drone radar system. The vehicle was also driven at a speed of 20, 30 and 40 mph. During the testing, a spectrum analyser and antenna were placed near the police speed camera to measure emissions coming towards speed camera. After carrying out this test scenario, no harmful interference was found.

A6.39 Under the other scenarios, we reduced the height of the drone radar to approximately 1.5m AGL, and the distance between the drone radar and the speed camera to 133.9m, 103.5m and 50m, respectively. For operational reasons, the vehicle only drove at speeds of 20 and 30mph for the 50m separation scenario. The results from these remaining scenarios showed that harmful interference was not being caused by the drone radar even if the distance between the two equipment was 50m and the radar was pointing directly at the speed camera.

[94] As per the guidance handbook, the systems typically have a 3dB horizontal beamwidth of less than 25°, and as low as 5° for across the road radar systems.

[95] We note that drone detection radar systems operating in 24 GHz features antenna gains of typically 20dBi, scanning approximately 120° in azimuth several times per second.

Level crossing radar

A6.40 Network Rail operates a number of level crossing radar sensor systems at locations across the UK, which are used to detect objects obstructing level crossings on the rail network, and if necessary, stop approaching trains, to prevent accidents or collisions. In June 2020, following a consultation in December 2019, Ofcom confirmed that we would be transferring these level crossing radars from their existing licence exemption regime to a specific licence to be held by Network Rail, in order to make sure that these systems could be deployed in as wide a range of locations as possible.

A6.41 As set out in our enabling mmWave spectrum for new uses consultation, we carried out technical work which indicated that these radar systems are very robust against interference. Based on this we would expect that new users in the band are unlikely to pose a risk of harmful interference to these systems. We note that the proposed 24 GHz drone detection radar parameters are typically higher power than we considered in our measurements.[96] However, we note that drone detection radar systems typically scan over a wide area using a highly directional beam, minimising the risk of main beam coupling. Furthermore, we consider that deployment of drone detection radars is likely to be less widespread than 5G deployments. We therefore consider that the risk of harmful interference is low.

A6.42 We also understand that in the unlikely event of harmful interference, these systems would record a false positive, meaning that even in this scenario, harmful interference to these radars would not pose any risk to safety on the railway.

A6.43 Therefore, we consider that there is very little risk of harmful interference between drone detection radar systems and level crossing radar systems.

[96] Drone detection radar systems in 24 GHz are expected to operate at up to 54dBm, compared to 5G NR systems at approximately 21dBm.

A7. Satellite frequencies currently authorised for UAS control

System	Frequency	Requirements
Satellite Earth Station Communication	14 to 14.47 GHz	• 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; • The Satellite Earth Station may transmit with an e.i.r.p. no greater than 55 dBW; • 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; • 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; • All transmissions from the Satellite Earth Station must be clearly identifiable; • The Satellite Earth Station must at all times operate such that it conforms to Interface Requirement IR 2077, published by Ofcom; • The Satellite Earth Station shall meet the conditions given in footnotes 5.504B, 5.504C, 5.508A and 5.509A of the Radio Regulations so as not to cause harmful interference to terrestrial fixed and radio astronomy stations.
	1525 to 1660.5 MHz	
	1980 to 2010 MHz	• 45 dBm / 200 kHz e.i.r.p. is permitted when operating at altitudes of 1000 metres and above; or • 24 dBm / 200 kHz e.i.r.p. is permitted when operating at an altitude below 1000 metres.
	27.5 to 27.8185 GHz 28.4545 to 28.8265 GHz 29.4625 to 30 GHz for transmission (Earth-to-space)	• Satellite Earth Station to geostationary orbit (GSO) satellites 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. • Satellite Earth Stations operating to Non-GSO (NGSO) satellites are not permitted. • The operation of the Earth stations in motion • (ESIM) Equipment shall comply with the technical and operational criteria contained within the UK Interface Requirement 2093, published by Ofcom. • The Licensee must have written permission for airborne use of its User Equipment (UE) from the satellite network(s) to which that UE connects.
2 GHz Complementary Ground Component (CGC)	1980 -2010 MHz	• The Licensee is only authorised to operate the 2 GHz CGC Equipment to connect with a satellite or CGCs operated by Inmarsat Ventures Limited or EchoStar forming part of a 2 GHz Mobile Satellite System. • Transmit power when transmitting to one or more CGCs: • 40 dBm e.i.r.p is permitted when operating at altitudes of 1000 metres and above; or • 24 dBm e.i.r.p. is permitted when operating at altitudes below 1000 metres.

A8. Responding to this consultation

How to respond

A8.1 Ofcom would like to receive views and comments on the issues raised in this document, by 5pm on 30 September 2026.

A8.2 You can download a response form from https://www.ofcom.org.uk/spectrum/innovative-use-of-spectrum/enabling-drone-innovation-and-security. You can return this by email or post to the address provided in the response form.

A8.3 If your response is a large file, or has supporting charts, tables, or other data, please email it to uas@ofcom.org.uk, as an attachment in Microsoft Word format, together with the cover sheet.

A8.4 We welcome responses in formats other than print, for example an audio recording or a British Sign Language video. To respond in BSL:

- send us a recording of you signing your response. This should be no longer than 5 minutes. Suitable file formats are DVDs, wmv or QuickTime files; or
- upload a video of you signing your response directly to YouTube (or another hosting site) and send us the link.

A8.5 We will publish a transcript of any audio or video responses we receive (unless your response is confidential)

A8.6 We do not need a paper copy of your response as well as an electronic version. We will acknowledge receipt of a response submitted to us by email.

A8.7 You do not have to answer all the questions in the consultation if you do not have a view; a short response on just one point is fine. We also welcome joint responses.

A8.8 It would be helpful if your response could include direct answers to the questions asked in the consultation document. The questions are listed at Annex 11. It would also help if you could explain why you hold your views, and what you think the effect of Ofcom's proposals would be.

A8.9 If you want to discuss the issues and questions raised in this consultation, please contact us by email at: uas@ofcom.org.uk.

Confidentiality

A8.10 Consultations are more effective if we publish the responses before the consultation period closes. This can help people and organisations with limited resources or familiarity with the issues to respond in a more informed way. So, in the interests of transparency and good regulatory practice, and because we believe it is important that everyone who is interested in an issue can see other respondents' views, we usually publish responses on the Ofcom website at regular intervals during and after the consultation period.

A8.11 If you think your response should be kept confidential, please specify which part(s) this applies to and explain why. Please send any confidential sections as a separate annex. If you want your name, address, other contact details, or job title to remain confidential, please provide them only in the cover sheet, so that we do not have to edit your response.

A8.12 If someone asks us to keep part or all of a response confidential, we will treat this request seriously and try to respect it. But sometimes we will need to publish all responses, including those that are marked as confidential, in order to meet legal obligations.

A8.13 To fulfil our pre-disclosure duty, we may share a copy of your response with the relevant government department before we publish it on our website.

A8.14 Please also note that copyright and all other intellectual property in responses will be assumed to be licensed to Ofcom to use. Ofcom's intellectual property rights are explained further in our Terms of Use.

Next steps

A8.15 Following this consultation period, Ofcom plans to publish a statement in XXXX 20xx.

A8.16 If you wish, you can register to receive mail updates alerting you to new Ofcom publications.

Ofcom's consultation processes

A8.17 Ofcom aims to make responding to a consultation as easy as possible. For more information, please see our consultation principles in Annex 9.

A8.18 If you have any comments or suggestions on how we manage our consultations, please email us at consult@ofcom.org.uk. We particularly welcome ideas on how Ofcom could more effectively seek the views of groups or individuals, such as small businesses and residential consumers, who are less likely to give their opinions through a formal consultation.

A8.19 If you would like to discuss these issues, or Ofcom's consultation processes more generally, please contact the corporation secretary:

Corporation Secretary
Ofcom
Riverside House
2a Southwark Bridge Road
London SE1 9HA
Email: corporationsecretary@ofcom.org.uk

A9. Ofcom's consultation principles

A9.1 Ofcom has seven principles that it follows for every public written consultation:

Before the consultation

1. Wherever possible, we will hold informal talks with people and organisations before announcing a big consultation, to find out whether we are thinking along the right lines. If we do not have enough time to do this, we will hold an open meeting to explain our proposals, shortly after announcing the consultation.

During the consultation

2. We will be clear about whom we are consulting, why, on what questions and for how long.
3. We will make the consultation document as short and simple as possible, with an overview of no more than two pages. We will try to make it as easy as possible for people to give us a written response.
4. When setting the length of the consultation period, we will consider the nature of our proposals and their potential impact. We will always make clear the closing date for responses.
5. A person within Ofcom will be in charge of making sure we follow our own guidelines and aim to reach the largest possible number of people and organisations who may be interested in the outcome of our decisions. Ofcom's Consultation Champion is the main person to contact if you have views on the way we run our consultations.
6. If we are not able to follow any of these principles, we will explain why.

After the consultation

7. We think it is important that everyone who is interested in an issue can see other people's views, so we usually publish the responses on our website at regular intervals during and after the consultation period. After the consultation we will make our decisions and publish a statement explaining what we are going to do, and why, showing how respondents' views helped to shape these decisions.

A10. Consultation coversheet

Basic details

Consultation title:

To (Ofcom contact):

Name of respondent:

Representing (self or organisation/s):

Address (if not received by email):

Confidentiality

Please tick below what part of your response you consider is confidential, giving your reasons why

- Nothing ☐
- Name/contact details/job title ☐
- Whole response ☐
- Organisation ☐
- Part of the response ☐

If you selected 'Part of the response,' please specify which parts:

If you want part of your response, your name, or your organisation not to be published, can Ofcom still publish a reference to the contents of your response (including, for any confidential parts, a general summary that does not disclose the specific information or enable you to be identified)?

Yes ☐ No ☐

Declaration

I confirm that the correspondence supplied with this cover sheet is a formal consultation response that Ofcom can publish. However, in supplying this response, I understand that Ofcom may need to publish all responses, including those which are marked as confidential, in order to meet legal obligations. If I have sent my response by email, Ofcom can disregard any standard e-mail text about not disclosing email contents and attachments.

Ofcom aims to publish responses at regular intervals during and after the consultation period. If your response is non-confidential (in whole or in part), and you would prefer us to publish your response only once the consultation has ended, please tick here.

Name Signed (if hard copy)

A11. Consultation questions

Please tell us how you came across this consultation.

- ☐ Email from Ofcom
- ☐ Saw it on social media.
- ☐ Found it on Ofcom's website.
- ☐ Found it on another website.
- ☐ Heard about it on TV or radio.
- ☐ Read about it in a newspaper or magazine.
- ☐ Heard about it at an event.
- ☐ Somebody told me or shared it with me.
- ☐ Other (please specify)

Question 1: Do you have any comments on our impact assessments as set out in Annex 1? Please specify whether your comments relate to:

- our wider impact assessment;
- our equality impact assessment; or
- our Welsh language impact assessment.

Question 2: Do you agree with our assessment of the 450 MHz and 5030-5091 MHz bands for drone control links? Do you agree there is demand for these bands in the UK (please identify any relevant use cases and locations in your response)? Are there any other frequency bands we should consider for control links?

Question 3: Do you have any comments on our proposed approach to coordinating drones with other users of the 450 MHz band? In your response, please indicate whether it relates to co-channel or adjacent channel use, and provide evidence for any coexistence issues raised.

Question 4: Do you have any comments on our proposed 450 MHz drone authorisation approach? Please provide any specific views (including technical justification where relevant) on:

- the proposed technical conditions, including operating height AGL, power, channel bandwidth, designated service area, and number of base stations;
- the proposed non-technical conditions, including licence fees and term, frequency flexibility and complying with CAA rules and radio equipment standards; and
- reviewing our initial authorisation approach.

Question 5: Do you have any comments on our proposed 5030-5091 MHz drone authorisation approach? Please provide any specific views (including technical justification where relevant) on:

- the portion of the band proposed for early release (5040-5060 MHz);
- the proposed technical parameters and approach to coordinating drones and/or protecting other users of the band; and
- the proposal to phase out licences once there is global harmonisation, the required transition period and sunset clause.

Question 6: Do you have comments on our proposal to create a new drone detection radar licence for the 24 GHz band, including the proposed technical and non-technical conditions, the proposed draft licence in Annex 12, and our coexistence analysis in Annex 6? Please provide evidence for any issues raised.

Question 7: Do you have comments on our proposal to create a new drone detection radar licence for the 16 GHz band on a case-by-case basis, including the proposed technical and non-technical conditions and proposed draft licence in Annex 12? Please provide evidence for any issues raised.

Question 8: Have you identified any other frequency bands we should consider for drone control links in the longer term?

Question 9: Do you have any comments related to the existing satellite frequencies available for drone control links?

Question 10: What are your needs and priorities for accessing spectrum for drone safety? Do you have interest in future use of 15 GHz and/or 76 GHz, or other specific frequencies and bands for similar drone safety use?

Question 11: Do you have any interest in ground based UAT to complement the aerial component in 978 MHz licences?

Question 12: Are you interested in or do you have any plans to trial the use of ISAC for drone detection purposes?

Question 13: Do you have any other comments on this consultation document?

A12. Proposed draft licence: 16 and 24 GHz drone detection radar

A12.1 We have published the proposed draft licence for 16 and 24 GHz drone detection radar separately, which is available here.