Making more spectrum in the 1.4 GHz band available for mobile services

Call for inputs on Ofcom's coexistence analysis

Call for inputs

Published: 18 October 2023
Closing date for responses: 12 January 2024

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1. Overview

1.1 The 1492-1517 MHz frequency block within the 1.4 GHz band has been identified for mobile use, and we are now considering how to make it available.

1.2 The adjacent block of spectrum in the 1.5 GHz band is currently used to operate Inmarsat emergency communication satellite terminals on ships at and near ports, and on aircraft at and above airports. Use of 1492-1517 MHz for mobile services is likely to cause interference to the receivers in these satellite terminals.

1.3 This document sets out the technical analysis we have conducted to estimate the likely extent of such interference, and our initial views on the measures we could take to mitigate the interference risk.

What we are proposing – in brief

Coexistence analysis

In order to protect these satellite terminals from new mobile use of the 1492-1517 MHz block, we propose to:

- define areas at ports and airports in which power flux density ("**PFD**") from mobile base stations must not exceed certain limits ("**PFD limited zones**"); and
- define larger areas around these PFD limited areas within which new mobile base station installations will be coordinated to ensure that PFD limits are not exceeded within the ports and airports ("**coordination zones**").

We are seeking stakeholders' views on this initial proposal, as well as on how we should define these PFD limited zones and coordination zones. In this document, we explain our initial view that these zones could be defined by either simple or complex polygons, and we are interested in stakeholders' views on these options, as well as other options they consider might be appropriate.

Options for making this spectrum available

Our initial view is that it may be appropriate to use an auction to authorise use of the 1492-1517 MHz block. We are also seeking stakeholders' views on the format of a potential auction, as well as the most appropriate lot sizes.

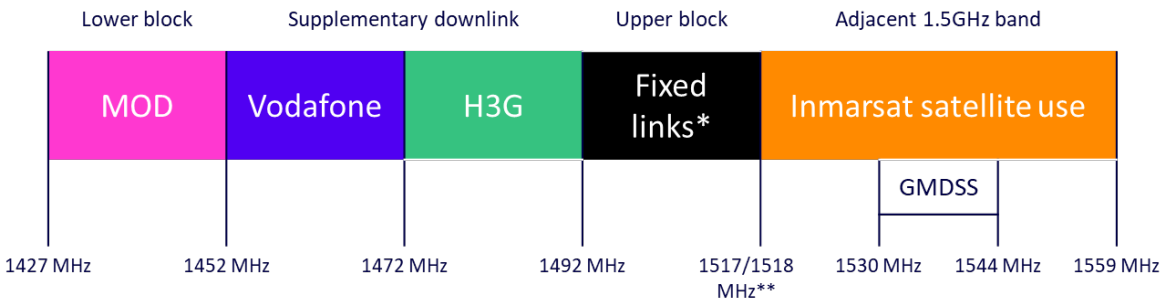
The overview section in this document is a simplified high-level summary only. The full document sets out the information and questions that we are seeking stakeholder input on.

2. Background

The 1.4 GHz band

Current use of the 1.4 GHz band

2.1 The diagram below shows the current use of the 1.4 GHz band and the adjacent 1.5 GHz band.



**Fixed links are authorised to use this spectrum until December 2024*
***1517-1518 MHz is assigned for Programme Making and Special Event use*

2.2 The centre of the 1.4 GHz band (1452-1492 MHz) is already licensed to Vodafone and H3G, which use the spectrum to provide supplementary downlink ("**SDL**") mobile services. The bottom 25 MHz of the band (1427-1452 MHz – shown in pink above) is currently used by the Ministry of Defence ("**MOD**").

2.3 The focus of this call for inputs, however, is the spectrum between 1492 and 1517 MHz (shown in black above). We refer to this as the "**upper block**". Taking into account EC Decision 2018/661 (the "**Decision**")[1] and our overarching spectrum strategy to make more spectrum available for mobile, we began a formal process to clear fixed links from this spectrum in May 2019, and the spectrum will be entirely clear of fixed links by the end of 2024. At that point, the current licensing restrictions on Vodafone and H3G requiring them to protect fixed links in the adjacent band will also expire. We are now looking to make the upper block spectrum available for mobile.

1518-1525 MHz

2.4 The adjacent block of spectrum in the 1.5 GHz band (1518-1559 MHz – shown in orange above) is currently used by Inmarsat to operate satellite terminals on ships at and near ports, and aircraft at and above airports.

2.5 On ships, the 1530-1544 MHz block forms part of the Global Maritime Distress and Safety System ("**GMDSS**") that is governed by the international Safety of Life at Sea ("**SOLAS**") Convention. Under this Convention, it is unlawful for a ship to leave port if it cannot demonstrate that its emergency communications are operating.

[1] Commission Implementing Decision (EU) 2018/661 of 26 April 2018 amending Implementing Decision (EU) 2015/750 on the harmonisation of the 1452-1492 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Union as regards its extension in the harmonised 1427-1452 MHz and 1492-1517 MHz frequency bands (2018), Official Journal L110, pg. 127.

2.6 Satellite terminals accessing Inmarsat services in the 1518-1559 MHz block are also used on board aircraft. In the UK, the Basic Regulation states that a flight must not be commenced unless "it has been ascertained by reasonable means available" that the pilot is satisfied that "navigation, communication and other equipment necessary for the intended flight" (including radio equipment used to communicate with the emergency services in the 1518-1559 MHz block) are installed in the aircraft and are operative.[2]

2.7 Use of 1492-1517 MHz for mobile services may cause interference to these Inmarsat satellite receivers. GMDSS communications are carried in the 1530-1544 MHz part of the band but existing satellite receivers are susceptible to blocking from transmissions at frequencies below 1518 GHz across their full receive range (1518-1559 MHz) and so interference from nearby mobile SDL transmissions may affect GMDSS.

2.8 We have carried out technical analysis to estimate the likely extent of such interference, and the potential measures we could take to mitigate the interference risk. Our initial analysis demonstrates that we are likely to need to impose restrictions on the use of the upper block of the 1.4 GHz band for mobile, especially close to ports and airports. More detail on this technical analysis, and our initial results, is set out in Section 3 of this document.

Call for inputs

2.9 We would now like to engage with interested stakeholders, and we are seeking stakeholders' views on (i) our initial technical analysis and our initial views on how we might mitigate the interference risks explained above, and (ii) the award process that would best make this spectrum available for mobile use.

Next steps

2.10 The closing date for responses to this call for inputs is 12 January 2024. We will consider all responses received, after which we intend to publish a detailed consultation on our proposals for making the upper block of 1.4 GHz spectrum available.

[2] Regulation 2018-1139 (the Basic Regulation), Annex V "Essential Requirements for Air Operations", part 2 "Flight Operation" and part 5 "Instruments, Data and Equipment". There may also be other international requirements relating to the use of emergency communications equipment installed in aircraft which operate in the 1518-1559 MHz block.

3. Coexistence analysis

Background

3.1 The European Conference of Postal and Telecommunications Administrations ("**CEPT**") and the International Telecommunications Union ("**ITU**") have acknowledged the potential for interference between mobile base stations offering supplementary downlink ("**SDL**") services in the 1492-1517 MHz block and existing satellite receivers using the 1518-1559 MHz block.

3.2 We recognise that older satellite receivers using the 1518-1559 MHz block can be much more susceptible to interference from the adjacent band than newer variants. These satellite receivers are installed in ships and aircraft, and typically have a long service life. This means that there are still large numbers of older receivers in circulation.

3.3 A revised technical standard for new satellite receivers is now active, so it is expected that coexistence will improve as the satellite receiver fleet is refreshed. As a result, it should be possible to relax any technical conditions imposed on mobile base station installations for the purposes of ensuring coexistence of the older, more susceptible satellite receivers in the future, but this will take a number of years.

3.4 Previous technical studies within CEPT have evaluated the coexistence between these systems, leading to recommended technical conditions for deployment of SDL services in this band. We have based our analysis on the following reports and recommendations:

- ECC report 263,[3] which recommends suitable system parameters for satellite and mobile systems for simulation purposes and describes a series of Monte-Carlo simulations[4] of coexistence between them.
- ECC report 299,[5] which provides detailed measurement results for the susceptibility of different models of satellite terminal to interference from mobile signals in 1492-1517 MHz. It also provides recommended power flux density ("**PFD**") limits for the deployment of mobile base stations around ports and airports. A two-phased approach is proposed, with initial 'Phase 1' PFD limits proposed for current use, and a set of more relaxed 'Phase 2' PFD limits for future use in anticipation of most satellite receivers conforming to the latest technical standards.
- ECC Decision (17)06,[6] which recommends some least restrictive technical conditions for the deployment of mobile systems in this band, including maximum effective isotropic radiated power ("**EIRP**") limits of +68 dBm in 1492-1512 MHz and +58 dBm in 1512-1517 MHz.

[3] ECC Report 263, 'Adjacent band compatibility studies between IMT operating in the frequency band 1492-1518 MHz and the MSS operating in the frequency band 1518-1525 MHz', 3 March 2017.
[4] A Monte-Carlo simulation is a mathematical technique used to estimate the possible outcomes of an uncertain event. It is often used to assess the impact of risk in real-life scenarios.
[5] ECC Report 299, 'Measures to address potential blocking of MES operating in bands adjacent to 1518 MHz (including 1525-1559 MHz) at sea ports and airports', 8 March 2019.
[6] ECC Decision (17)06, 'The harmonised use of the frequency bands 1427-1452 MHz and 1492-1518 MHz for Mobile/Fixed Communications Networks Supplemental Downlink', 17 November 2017.

3.5 In addition, discussion in ITU-R Study Groups 4 and 5 has resulted in a recently approved report and recommendation for this band. The ECC recommendations are included in that report as a suitable approach to protection of satellite receivers.

3.6 We have carried out our own initial analysis, which is based on the ECC work and only considers satellite receivers carried by ships and aircraft operating from UK ports and airports.

3.7 We have not assessed the impact on land-based satellite receivers and do not intend to provide specific protection measures for these. This is because land terminals are designed to be portable, meaning that their location and other technical parameters are subject to constant change. As such, they cannot be effectively coordinated without sterilising the 1492-1517 MHz block across the whole of the UK.

3.8 There are approximately 200 ports and 130 airports in the UK where there is use of satellite services in the 1518-1559 MHz block. We selected a number of these locations,[7] which we consider provide a representative sample, to analyse the impact that nearby mobile base stations using the 1492-1517 MHz block might have on these satellite services. We have simulated these to establish the extent of likely interference effects around these ports and airports, and how it is affected by the terrain and the distribution of these locations in the UK.

Method

3.9 The aim of our analysis was to:

a) assess the protection required for satellite terminals near ports and airports from mobile deployments in the 1492-1517 MHz block; and
b) establish the areas around each port and airport within which mobile base station deployments using the 1492-1517 MHz block could cause interference to satellite receivers.

3.10 We have taken the technical parameters we used in our analysis, including the antenna patterns of the mobile base stations, from ECC report 263, ECC report 299 and ECC Decision (17)06. These parameters are summarised in Table 1 and Table 2.

Summary of our analysis

3.11 We have carried out the following analysis steps:

a) We calculated the minimum radio propagation isolation required for the different satellite terminal models tested in ECC report 299 for them to operate without being blocked by mobile base station transmissions in the 1492-1512 MHz and 1512-1517 MHz blocks.
b) Using a general (non-terrain specific) propagation model,[8] we then computed the maximum separation distances required between typical mobile base stations and

[7] Ports: The Solent area (including Southampton, Portsmouth, Gosport, Chichester, Cowes, Lymington, Yarmouth), Felixstowe, Belfast, Liverpool, Edinburgh, London (including Purfleet, Rotherhithe, Surrey Quays, Barrier Gardens Pier, Silvertown, Dagenham, Erith), Cardiff, Dover. Airports: London Heathrow, London Gatwick, Luton, Birmingham, Glasgow.

[8] We used freespace propagation and a Hata propagation model for this initial analysis.

victim satellite receivers to avoid blocking. We also computed the distance from a base station at which the recommended PFD limits in ECC report 299 Annex 2 were met.

c) Based on these initial calculations, we chose the Inmarsat C type terminal with a fixed 3 dBi antenna for the rest of our analysis for ports. This terminal was found to be the most susceptible to blocking in the ECC report 299 measurements and is one of the most commonly deployed terminals. For airports, we assumed a Classic Aero (AES E) victim.
d) Using the Visualyse propagation modelling application, we simulated the radio propagation losses around the example ports and airports. This allowed us to determine how the local terrain affected the required separation distances between mobile base stations and victim satellite receivers in those ports and airports.
e) We simulated victim satellite receivers in each of the example ports and airports, located within areas where Inmarsat has told us it expects there to be a significant number of receiving terminals. We plotted the areas around each port and airport where a mobile base station could generate significant interference at the victim receivers.
f) We used different thresholds to establish the likely effects on the different models of satellite receiver set out in ECC report 299, ranging from the oldest (most vulnerable) to latest (least vulnerable) models.
g) Our first simulations used the maximum recommended EIRP for mobile base stations as set out in ECC Decision 17(06). This allowed us to determine the maximum required separation distances, to show where coordination and careful planning of mobile base stations will be required. This also showed how these distances could be reduced in the future as satellite receivers become more resilient to adjacent band interference.
h) Following our initial simulations, we focussed on the London and Southampton port areas, where there are several individual port areas in close proximity. To show how much the required separation distances could be reduced if measures were taken to reduce the mobile base station power directed at port areas, we simulated with a reduced mobile base station EIRP. A reduced EIRP could be achieved in practice through reduced transmit power, antenna downtilt and/or directional antennas.

Parameters and assumptions

3.12 We explain below the assumptions that we have made about the characteristics and parameters of: (i) mobile base stations, (ii) the satellite receiver terminals, (iii) the terrain and (iv) the propagation of the spectrum.

3.13 We modelled the propagation loss using the ITU-R P.452-16 propagation model,[9] the ITU's recommended model for this purpose, and an Ofcom 50m terrain database (based on UK Ordnance Survey data). We took the upper limit values for the mobile base station's height and antenna gains from ECC report 263 and used the same values for our analysis in urban and rural areas.

3.14 In our analysis, we assumed the mobile base station's channel was 5 MHz wide and centred at 1509.5 MHz or 1514.5 MHz. We set thresholds for the area analysis based on the measured blocking levels reported in ECC report 299.

3.15 For each area analysed, we placed mobile base stations at a minimum of 0.25 km intervals around each port or airport in the modelling software. This was to determine how close the

[9] Recommendation ITU-R P.452-16, 'Prediction procedure for the evaluation of interference between stations on the surface of the Earth at frequencies above about 0.1 GHz', July 2015.

mobile base stations could be placed without exceeding the measured blocking performance levels for satellite terminals.

3.16 We repeated our simulations around the London and Solent area ports using an EIRP of 38 dBm in the 1492-1512 MHz block to establish how close mobile base stations could be deployed if they used practical measures to limit the power they radiate in the direction of the ports.

Table 1. Mobile Base Station Assumptions

Parameter	Value	Justification
Maximum EIRP	68 dBm/5 MHz (1492-1512 MHz) 58 dBm/5 MHz (1512-1517 MHz)	ECC Dec (17)06. To compute maximum required separation distances.
	38 dBm/5 MHz (1492-1512 MHz)	Reduced EIRP to show how practical measures to limit PFD could be used.
Maximum antenna gain	18 dBi (rural)	ECC 263
Antenna height (max)	30m (rural, suburban)	ECC 263
Feeder loss	3 dB	ECC 263
Antenna Downtilt	3 degrees (rural)	ECC 263
Propagation model	ITU-R P.452-16	Widely used in coexistence analysis
Polarization	Linear	ECC 263
Antenna pattern	Taken from ECC 263	Worst case

Table 2. Satellite Terminal Assumptions

Parameters	Values	Justification
Downlink frequency	1518.1 MHz	Worst case
Bandwidth	200 kHz	ECC 263
Receiver noise temperature	316 K	ECC 263

Parameters	Values	Justification
Measured receiver blocking levels for Inmarsat C Model-1 from a **single** LTE channel at 1502-1512 MHz	-68 dBm for 5MHz LTE carrier	Table 7 of ECC 299
Measured receiver blocking levels for Inmarsat C Model-1 from **multiple** LTE channels at 1502-1512 MHz	-70 dBm for 5 MHz LTE carrier	Table 9 of ECC 299
Receiver blocking levels for Classic Aero (most susceptible AES - E/B) from **multiple** LTE channels at 1502-1512	-48.4 dBm for 5 MHz LTE carrier	Table 5 of ECC 299
Height of MES above sea level	10m	ECC 263
Height of AES at airport	10m	ECC 263
Height of AES above ground	100m, 150m and 200m	Worst case for take off
Inmarsat C antenna gain	3 dBi	ECC 263
Polarization	circular	ECC 263
Polarization loss	3 dB	Assumed for linear to circular polarization coupling
Propagation percent	20%	Standard for satellite use
Roll-off/satellite receiver's front-end filter response	Same as ECC 263	

Results of our analysis

3.17 In Figure 1 below, we show the areas within which our modelling predicts that interference could occur from mobile base stations around the sample ports and airports analysed. The red areas show where mobile base stations could interfere with the most vulnerable satellite receivers, with yellow shaded areas showing how these areas are reduced for less vulnerable victim receivers.

3.18 Our results show that interference between mobile base station transmissions and the most vulnerable current satellite receivers could occur when the base stations are up to:

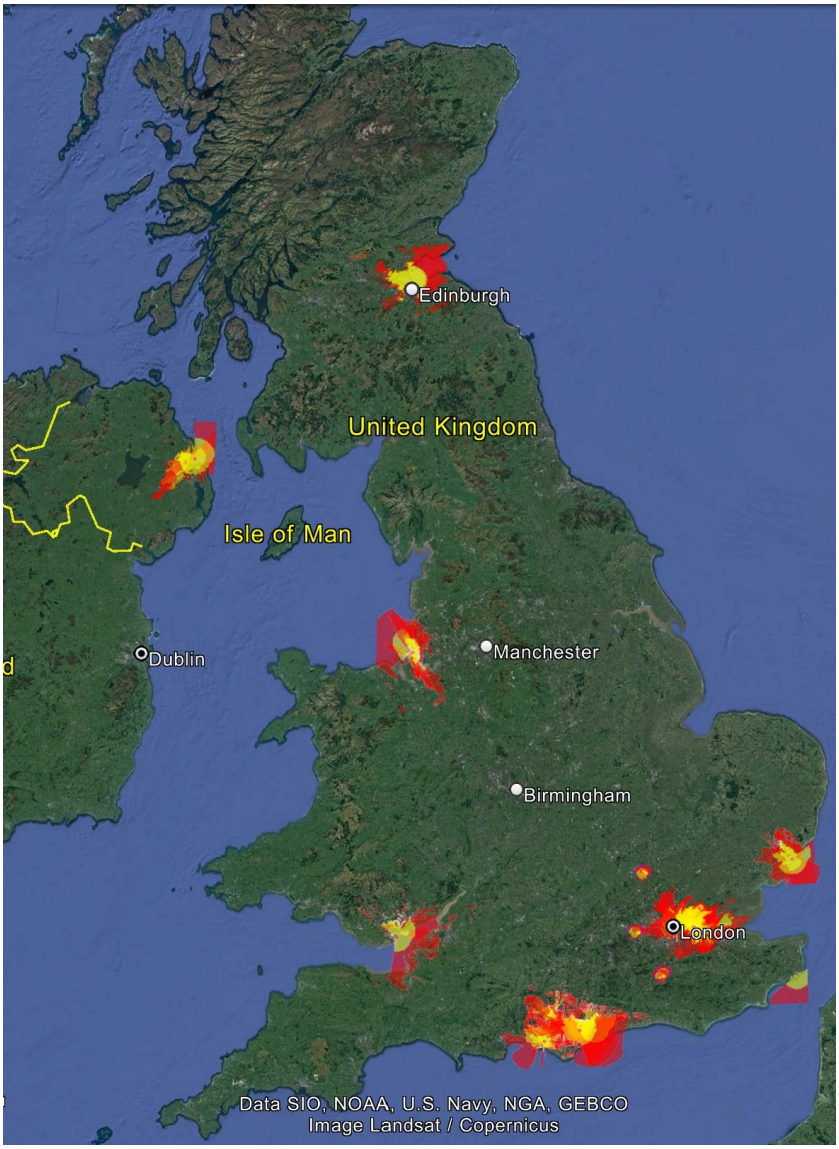
a) 55 km away from shipborne receivers in UK ports and waterways; and
b) 8 km away from aircraft at UK airports.

3.19 These are the maximum distances at which we found it is possible for interference to occur. For the port areas that we simulated, most interference occurred within a range of 30 km, with only marginal interference seen at ranges between 30-55 km.

3.20 These are also the distances computed for the most vulnerable satellite receiver models. For satellite receiver models with improved blocking performance (compliant with the latest technical standard), the maximum distances are reduced to 25 km for ports, or 3 km for airports.

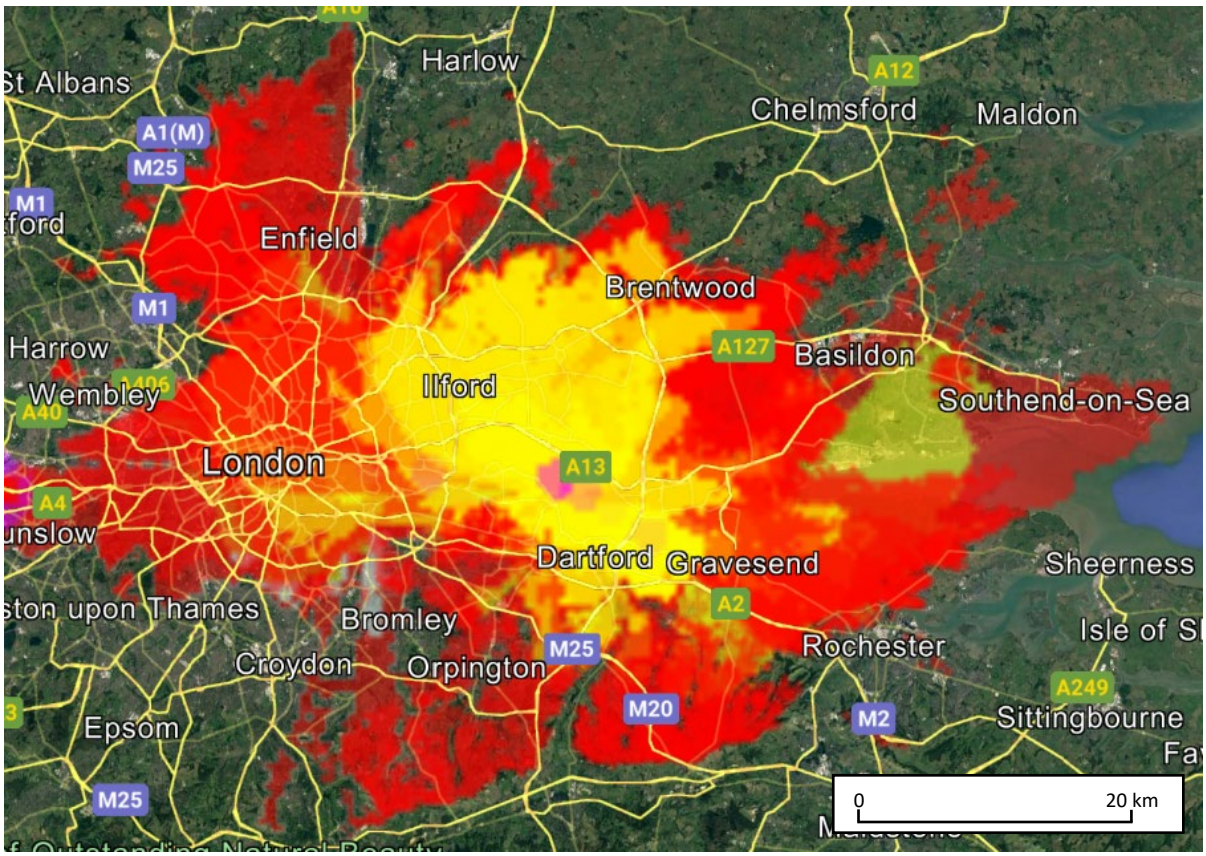
3.21 We found that the base station transmissions in 1512-1517 MHz have a much more significant effect on victim satellite receivers compared with transmissions at lower frequencies, in 1492-1512 MHz. The lower base station maximum EIRP (58 dBm in 1512-1517 MHz) recommended in ECC Decision 17(06) was important as this meant that similar separation distances were required for base station transmissions across the full 25 MHz of the band.

Figure 1. Potential interference distances around selected UK ports for current satellite terminals (red) and newer, less susceptible models (yellow).



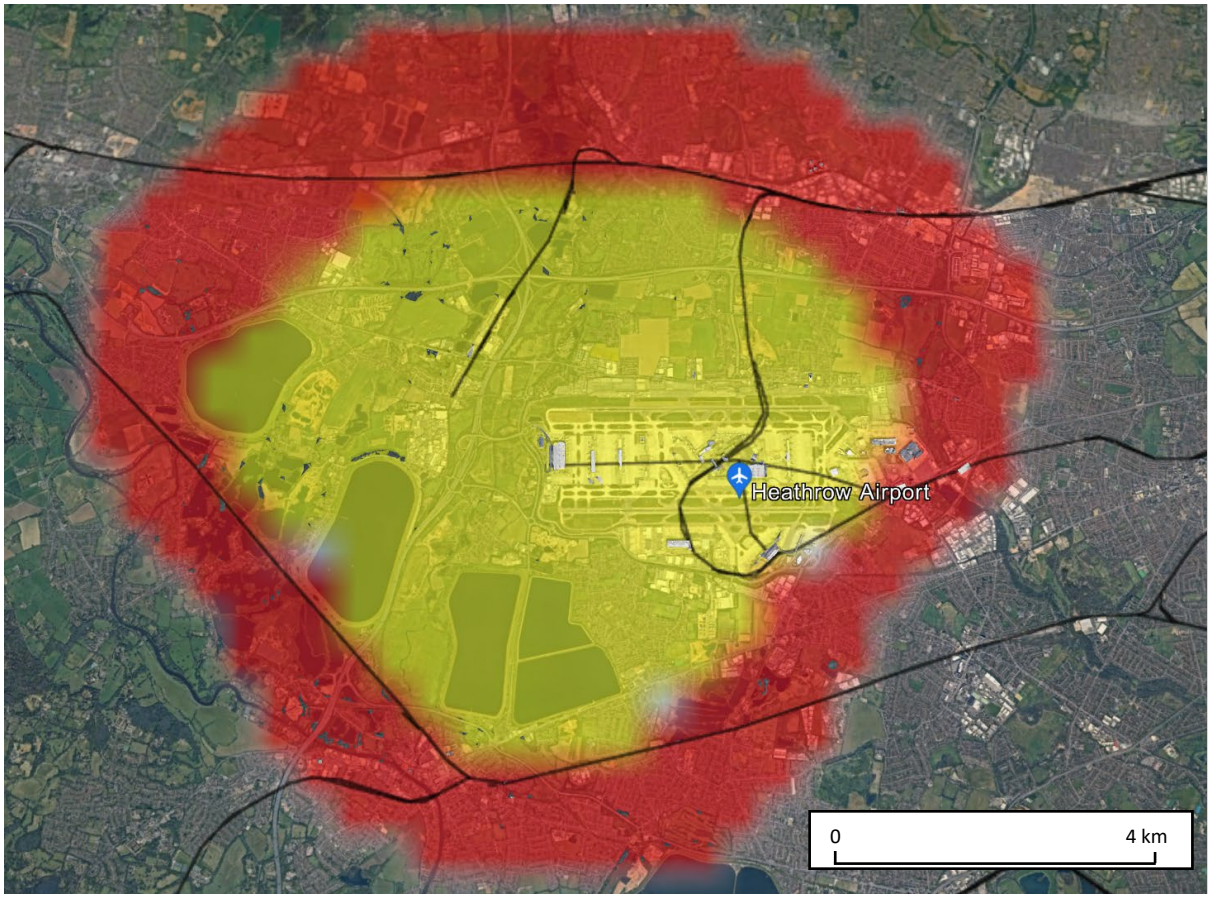
3.22 The areas where mobile base stations could cause interference to ship borne terminals in London ports are shown in Figure 2. ECC report 299 demonstrated that three different models of Inmarsat C terminal have different vulnerability to interference. These are shown in the red (model 1, most vulnerable), yellow (model 2) and purple areas (model 3, least vulnerable). Based on this analysis it is evident that, without careful planning, there is potential for mobile base stations installed across large parts of London to cause interference to ship borne terminals at ports.

Figure 2. Areas where mobile base stations could cause interference to ship borne terminals in two London ports for current satellite terminals (red) and newer, less susceptible models (yellow).



3.23 Figure 3 shows the areas in which mobile base stations could cause interference to aircraft satellite terminals at London Heathrow Airport. Aircraft terminals have been found to be more robust to interference, and so the distances over which interference may be caused are reduced compared with the ports.

Figure 3. Areas where mobile base stations could cause interference to aircraft satellite terminals at London Heathrow Airport for current satellite terminals (red) and newer, less susceptible models (yellow).

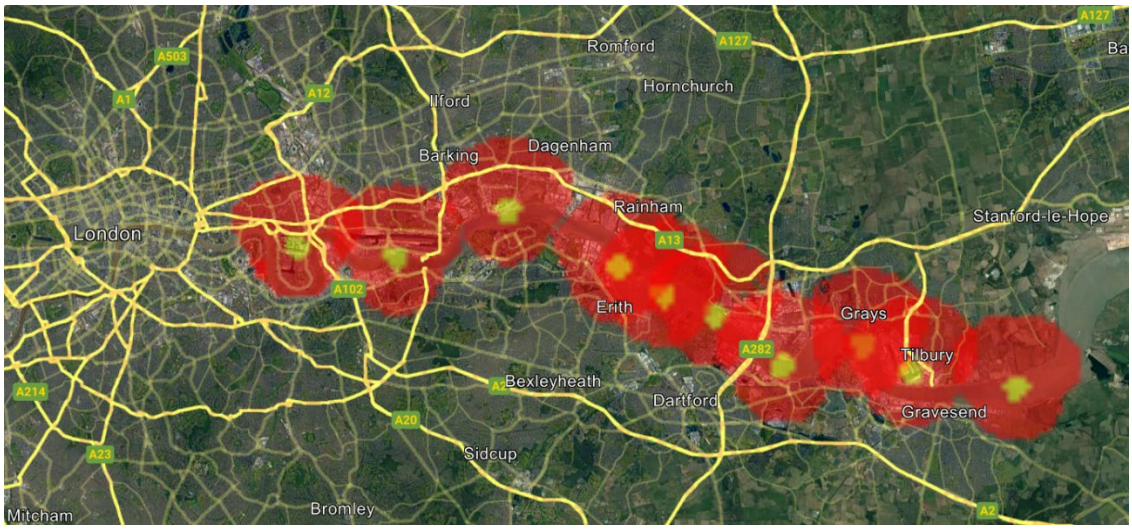


Mobile base station deployment examples

3.24 Figure 4 shows simulated interference areas around London port areas. In this simulation, we modelled mobile base stations with reduced EIRP (38 dBm in the 1492-1512 MHz block) in the direction of the port areas. This shows how directional antennas could be used to direct mobile base station transmissions away from the port areas. This simulation assumes that the mobile deployments are sectorised, but with sectors facing away from the port areas.

3.25 Again, the shaded red and yellow areas show where mobile base stations could cause interference to different satellite terminals within the ports. This shows that it is possible to install mobile base stations much closer to port areas if the EIRP in the direction of the ports is limited. In this case, mobile base stations could be installed as close as 6 km away for the most susceptible satellite receivers, or 1 km for the most robust receivers. These distances could be reduced further if the base station EIRP is reduced by more than we have assumed here.

Figure 4. Areas where mobile base stations could cause interference to ship borne terminals in London ports for current satellite terminals (red) and newer, less susceptible models (yellow), assuming reduced base station EIRP in the direction of the port areas.



Ofcom's provisional conclusions

3.26 Our initial view is that mobile base stations using 1492-1517 MHz could coexist with existing satellite receivers in ports and airport areas if controls are implemented to define:

i) areas at ports and airports within which mobile licensees are required to keep their PFD below the limits described in ECC report 299 ("**PFD limited zones**"). In practice, we consider that it will be difficult to deploy base stations within these zones without breaching the PFD limits, although it may be possible in some specific cases (e.g. inside airport buildings); and

ii) larger areas around each port and airport within which new mobile base station deployments must demonstrate that they will not breach the PFD limits within the defined PFD limited zones ("**coordination zones**").

3.27 We consider that the phase 1 and phase 2 PFD limits defined in ECC report 299 should be used to take a phased approach to technical licence conditions for new mobile base station deployments in this band. Our initial view is that we could revise the required PFD limits from phase 1 to phase 2 in the future when the satellite terminals in service have been largely replaced with new models that are less susceptible to interference.

3.28 At that point, it will also be possible to reduce the size of the coordination zones imposed around ports and airports.

3.29 It is currently unclear when it will be feasible to change these limits, however, ECC report 299 suggests a period of 5-7 years may be suitable. We are interested in stakeholders' views on the appropriate timing for this transition.

Implementation – Ofcom's initial view

3.30 We propose to follow the recommended EIRP limits given in ECC Decision (17)06 and the Phase 1 and 2 PFD limits given in ECC report 299 (Tables 12 and 13) to allow for implementation consistency with other countries.

3.31 Our initial view is that we should define zones in which the SDL PFD experienced by satellite terminals must be limited. These PFD limited zones would be located at and around ports and airports.

3.32 In addition, it is our initial view that we should define fixed range coordination zones around ports and airports within which proposed mobile base station installations will be coordinated to ensure the PFD limits are not exceeded within the PFD limited zones.

3.33 Some example PFD limited zones and example coordination zones are shown in Figure 5 and Figure 6 for London Heathrow Airport and Figure 7 and Figure 8 for the port of Southampton.

3.34 In both cases, the inner polygon bounding the PFD limited zone has been defined using the extent of satellite receiver activity in the area logged by Inmarsat. The coordination zone, shown as an outer ring in Figure 6 and Figure 8, has been defined by a simple radius around a central point, in this case with example radii of 8 km around Heathrow and 30 km around Southampton.

3.35 It should be noted that these simple examples are shown in isolation. In practice there would be overlapping or contiguous PFD limited zones, for example in the Solent where Southampton, Portsmouth, Gosport, Cowes, Lymington and Yarmouth ports and waterways are all nearby.

3.36 Coordination zones would overlap between these ports and would include Southampton airport. Similarly, the coordination zone for London Heathrow Airport would also overlap with that of nearby Northolt airport and possibly with the zones around London port areas.

Figure 5: London Heathrow Airport example - PFD limited zone

Figure 6: London Heathrow Airport example - PFD limited zone (inner) and coordination zone (outer)

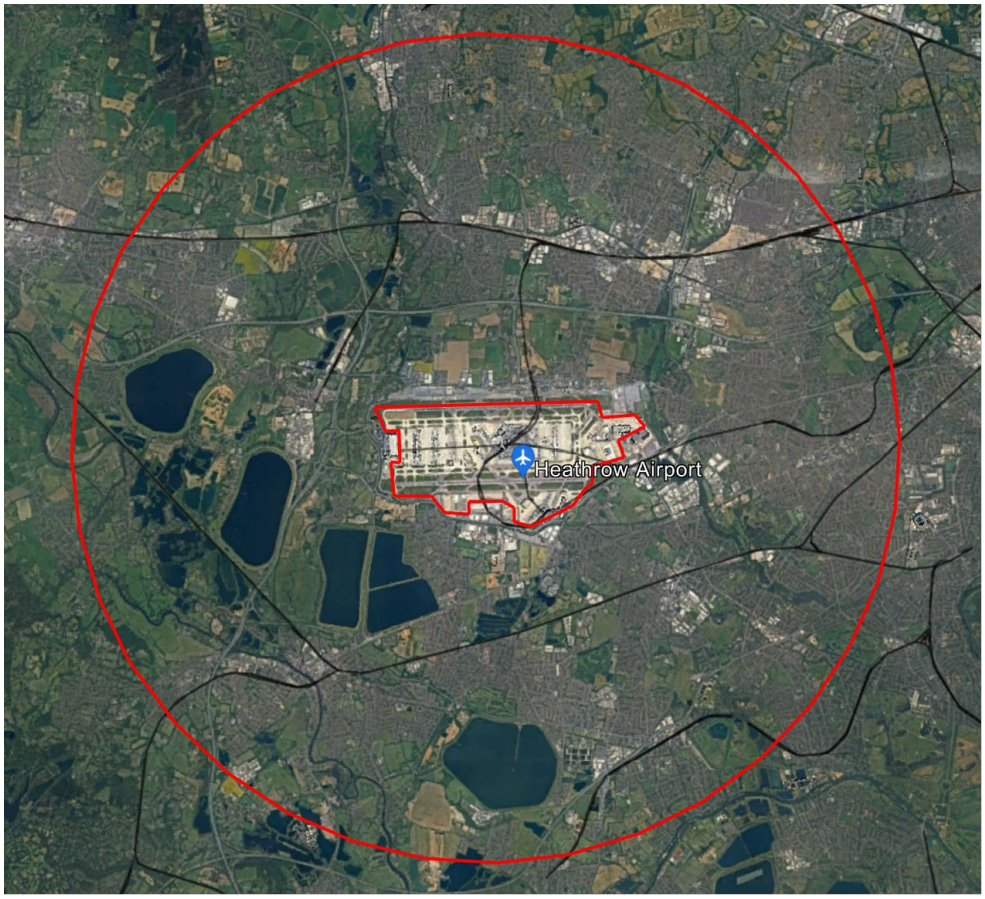
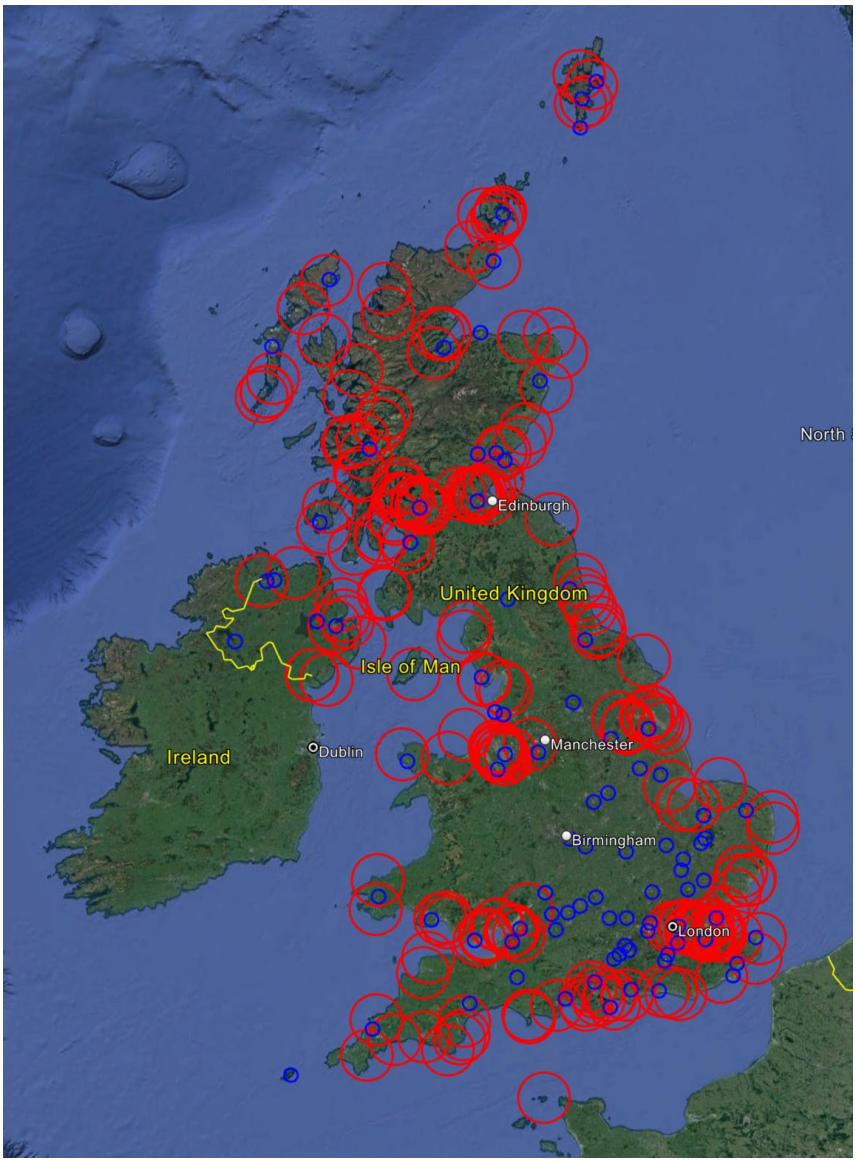


Figure 7: Port of Southampton example - PFD limited zone

Figure 8: Port of Southampton example - PFD limited zone (inner) and coordination zone (outer)

3.37 Figure 9 shows how the coordination zones around all UK ports and airports may overlap. With a radius of 30 km around ports and 8 km around airports, this shows that a significant portion of the coastal areas, as well as some highly populated urban areas, would fall into coordination zones.

Figure 9: Example coordination areas around UK ports (30 km - red) and airports (8 km - blue)



3.38 Our aim is to make the upper block of the 1.4 GHz band available for mobile, whilst providing adequate protection to satellite services using the adjacent band. The examples in the figures above set out some of the different options we have considered for how the PFD limited zones and coordination zones might be defined to achieve this.

3.39 We explain below two broad options for defining the PFD limited zones, and two broad options for defining the coordination zones. In general, our initial view is that using more complex shapes to define these areas is likely to lead to greater efficiency of spectrum use, but at the expense of complexity of implementation (both in terms of coordination and deployment). We are interested in stakeholders' views on their viability, both individually and as hybrids, as well as any other options stakeholders consider might be appropriate.

PFD limited zones

Option 1: a simple polygon or single point for each port or airport at which the PFD is measured

3.40 A PFD limited zone around each port and airport would be defined by a simple polygon (circle, rectangle or pixel boundary) or we would instead select a single point at which the PFD is measured and should not be exceeded.

3.41 Our initial view is that this would be simple to implement but could mean that some areas are not adequately protected.

Option 2: complex polygons

3.42 As set out in Figure 5 and Figure 7, the polygon bounding the PFD limited zone would be defined using the extent of satellite receiver activity in the area logged by Inmarsat.

3.43 Our initial view is that this would provide adequate protection within the PFD zone, but may be more complex to implement.

Coordination zones

Option 1: simple polygons

3.44 Coordination zones would be defined by simple polygons, such as circles (as shown in Figure 6, Figure 8 and Figure 9), rectangles or pixel boundaries, to provide simplicity of implementation.

3.45 We consider this would provide adequate protection to satellites, but that it could potentially give rise to some inefficiency for network implementation by mobile operators.

Option 2: complex polygons

3.46 Coordination zones would be defined by more complex polygons which closely fit the outline of the modelled interference around each port or airport (such as the interference modelled in Figure 1, Figure 2, Figure 3 and Figure 4).

3.47 Our initial view is that this may provide optimum protection for satellites while also ensuring optimal use of spectrum for mobile. However, it may be complex for new mobile users of the spectrum to implement.

Timescales

3.48 We are aiming to make 1492-1517 MHz spectrum available for mobile in 2025.

3.49 Over time, we expect the numbers of older satellite terminals in circulation to reduce and so it may become appropriate to reduce any protection and coordination measures. Thus, it may become appropriate to relax the PFD limits that we impose in line with the phase 2 limits given in ECC report 299. The coordination areas may also be reduced in size as the potential distances over which interference could occur are reduced.

3.50 However, it is currently unclear when it will be possible to relax these conditions based on the risk of interference to older satellite terminals still in circulation. A period of 5-7 years is discussed in ECC report 299, but we welcome input from stakeholders on the likely timescales for this to be possible.

Questions

Question 1: Do you have any comments on the coexistence analysis we have carried out?

Question 2: Do you have any comments on the proposed sizes and implementation methods for the PFD limited and coordination zones, both individually and as hybrid options?

Question 3: Do you consider that PDF limited/coordination zones defined using complex polygons would make deployment of this spectrum for mobile more complex than zones which are defined by simple shapes?

Question 4: Do you have any other suggestions for how we might make the 1492-1517 MHz block available for mobile while protecting satellite use of the adjacent band?

Question 5: What are your views on the timescales for relaxing the PFD limits and coordination restrictions?

Question 6: Do you have any initial views on how the coordination we are proposing should be carried out? In particular, do you consider this should be conducted by Ofcom or the licensee?

Question 7: Do you have any views on the potential impact of our proposed options, including impacts on specific groups of persons or more general impacts?

4. Award process

Background

4.1 We are considering how best to make this spectrum available for new mobile use. We note that in the past we have used auctions to allocate mobile spectrum, as they ensure an efficient allocation of spectrum, particularly where we expect there to be excess demand. Our initial view is that there may be excess demand for this spectrum given that we intend to make it available for mobile services. As a result, we consider that it may be appropriate to use an auction to award this spectrum. We are therefore interested in stakeholders' initial views on (i) what allocation method they consider would be most appropriate for making the spectrum available and, (ii) if an auction is appropriate, the format and lot sizes available in that auction.

Auction format

4.2 If we were to make this spectrum available by auction, we consider the following formats could be appropriate:

a) A **sealed bid, single round auction format**. This means that bidding would be conducted in a single round, with the largest bid or largest combination of bids selected as the winning bids. Winning bidders could, for example, pay fees based on a second price rule.
b) A **multiple round ascending auction**. Bidding would be conducted over a number of rounds and prices would continue to rise while there is excess demand. When excess demand is zero the auction would end. A clock auction is an example of a multiple round ascending auction.

4.3 The main benefit of Option (a) is that it would be faster and operationally simpler than Option (b). There would be no need for auction software and there would only be a single round of bidding, which would simplify the process for bidders and Ofcom.

4.4 On the other hand, we have identified the following advantages of Option (b): bidders would have access to more information, such as excess demand, at the end of each round than under Option (a), which could help bidders in updating their bidding strategies. In addition, there is a lower likelihood of surprise outcomes in the auction because there would be multiple rounds of bidding.

Lot size

4.5 There is 25 MHz available in the upper block of the 1.4 GHz band. If stakeholders consider an auction is an appropriate way to allocate use of this spectrum, we seek views on whether stakeholders consider it appropriate to:

a) auction the 25 MHz as a single block; or
b) auction the 25 MHz in smaller lot sizes.[10]

[10] For example, as 5 lots of 5 MHz each; or as two lots, one of 10 MHz and one of 15 MHz.

Questions

Question 8: Do you consider an auction would be an appropriate way to make the upper 1.4 GHz spectrum available for mobile use? If not, what other methods do you think Ofcom should consider for making this spectrum available for mobile use?

Q**uestion 9:** If you consider an auction is appropriate, do you have any initial views on whether a single round auction or a multiple round auction would be more appropriate?

Question 10: Do you have any views on the appropriate lot sizes for making this spectrum available?

Question 11: Do you have any views on the potential impact on consumers, citizens and/or other stakeholders of auctioning the spectrum or the different auction formats?

A1 Responding to this call for inputs

How to respond

A1.1 If you would like to provide views and comments on the issues raised in this document, please do so no later than 5pm on 12 January 2024.

A1.2 You can download a response form from https://www.ofcom.org.uk/consultations-and-statements/category-1/call-for-input-spectrum-1.4-ghz-band-available-for-mobile-services. You can return this by email or post to the address provided in the response form.

A1.3 If your response is a large file, or has supporting charts, tables or other data, please email it to 1.4GHz.authorisation@ofcom.org.uk, as an attachment in Microsoft Word format, together with the cover sheet.

A1.4 Responses may alternatively be posted to the address below, marked with the title of the call for inputs:

Ofcom
Riverside House
2A Southwark Bridge Road
London SE1 9HA

A1.5 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.

A1.6 We will publish a transcript of any audio or video responses we receive (unless your response is confidential).

A1.7 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.

A1.8 You do not have to answer all the questions in the call for inputs if you do not have a view; a short response on just one point is fine. We also welcome joint responses.

A1.9 It would be helpful if your response could include direct answers to the questions asked in the call for inputs document. The questions are listed at Annex 4. 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.

A1.10 If you want to discuss the issues and questions raised in this call for inputs, please contact 1.4GHz Authorisation Team by email to 1.4GHz.authorisation@ofcom.org.uk.

Confidentiality

A1.11 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.

A1.12 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 don't have to edit your response.

A1.13 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.

A1.14 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.

A1.15 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

A1.16 Following this consultation period, we will consider all responses received, after which we intend to publish a detailed consultation on our proposals for making the upper block of 1.4 GHz spectrum available.

A1.17 If you wish, you can register to receive mail updates alerting you to new Ofcom publications.

Ofcom's consultation processes

A1.18 Ofcom aims to make responding to a consultation as easy as possible. For more information, please see our consultation principles in Annex 4.

A1.19 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.

A1.20 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

A2 Ofcom's consultation principles

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

Before the consultation

A2.1 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

A2.2 We will be clear about whom we are consulting, why, on what questions and for how long.

A2.3 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.

A2.4 We will consult for up to ten weeks, depending on the potential impact of our proposals.

A2.5 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.

A2.6 If we are not able to follow any of these seven principles, we will explain why.

After the consultation

A2.7 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.

A3 Call for inputs coversheet

Basic details

Call for inputs 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 call for inputs 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 call for inputs period. If your response is non-confidential (in whole or in part), and you would prefer us to publish your response only once the call for inputs has ended, please tick here.

Name Signed (if hard copy)

A4 Call for inputs questions

A4.1 We invite responses to the following questions we have asked in this CFI:

Question 1: Do you have any comments on the coexistence analysis we have carried out?

Question 2: Do you have any comments on the proposed sizes and implementation methods for the PFD limited and coordination zones, both individually and as hybrid options?

Question 3: Do you consider that PDF limited/coordination zones defined using complex polygons would make deployment of this spectrum for mobile more complex than zones which are defined by simple shapes?

Question 4: Do you have any other suggestions for how we might make the 1492-1517 MHz block available for mobile while protecting satellite use of the adjacent band?

Question 5: What are your views on the timescales for relaxing the PFD limits and coordination restrictions?

Question 6: Do you have any initial views on how the coordination we are proposing should be carried out? In particular, do you consider this should be conducted by Ofcom or the licensee?

Question 7: Do you have any views on the potential impact of our proposed options, including impacts on specific groups of persons or more general impacts?

Question 8: Do you consider an auction would be an appropriate way to make the upper 1.4 GHz spectrum available for mobile use? If not, what other methods do you think Ofcom should consider for making this spectrum available for mobile use?

Question 9: If you consider an auction is appropriate, do you have any initial views on whether a single round auction or a multiple round auction would be more appropriate?

Question 10: Do you have any views on the appropriate lot sizes for making this spectrum available?

Question 11: Do you have any views on the potential impact on consumers, citizens and/or other stakeholders of auctioning the spectrum or the different auction formats?