



Spectrum Management Approach in the 71-76 GHz and 81-86 GHz bands

Ofcom's decision on the future management
approach for the 70/80 GHz bands

Statement

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Section 1

Summary

- 1.1 This statement details Ofcom’s decision on the spectrum management approach in the 71-76 GHz and 81-86 GHz bands (“70/80 GHz”). This decision follows a review of the current management approach for this spectrum.
- 1.2 The review was initiated by Ofcom following the outcome of the Spectrum Review¹ (on the management of spectrum currently used by fixed links and shared services) which identified the need to reassess the management approach at 70/80 GHz as a key priority in order to facilitate fixed link requirements for 4G infrastructure.
- 1.3 The spectrum at 70/80 GHz has been used in the UK by the Fixed Service² since 2007. These bands have offered access to 2 x 4.75 GHz of spectrum and the ability to deploy applications with very high capacity capabilities (e.g. 1 Gbit/s and above) that are not supported in lower frequency bands used by the Fixed Service.
- 1.4 Ofcom publically consulted³ on proposals to change the management and authorisation approach within these bands following an extensive programme of stakeholder engagement.
- 1.5 Ofcom proposed a mixed management approach as set out in Figure 1 below. The self coordinated blocks 1 and 2 are already available for use and we proposed:
 - i) the continuation of these blocks under current procedures, and
 - ii) to make available the paired lower and upper sub-bands of the 70 and 80 GHz blocks under a new Ofcom coordinated approach as detailed in our consultation.



Figure 1: Segmented Plan for Mixed Management Approach

¹ <http://stakeholders.ofcom.org.uk/consultations/spectrum-review/update/>

² Radio Regulations 1.20 definition of *fixed service*: A radiocommunications service between two specified fixed points.

³ Policy consultation ran from 21 August 2013 to 14 October 2013 <http://stakeholders.ofcom.org.uk/consultations/70-80ghz-review/>

1.6 The consultation sought views on the following:

- The appropriateness of a mixed management approach to enable stakeholders to choose between a self coordinated authorisation approach and a new Ofcom coordinated authorisation approach. Specifically in relation to this, views were sought on the following:
 - The size of the spectrum blocks available to each authorisation approach;
 - The proposed 250 MHz of spectrum in each sub band separating the spectrum blocks under each authorisation approach as a practical interference mitigation measure.
- The aspects of the current self coordinated approach that would benefit from improvement. And specifically in relation to this approach:
 - Whether Ofcom should consider mandating the CEPT channel plan⁴ in the self coordinated block
 - Whether the technical parameters presented on the 70/80 GHz section of the wireless telegraphy register could be changed to allow more efficient coordination.

1.7 Ofcom separately issued a notice⁵ of proposed licence variation to existing 71-76 GHz and 81-86 GHz self coordinated link licensees which proposed bringing existing licences into alignment with the arrangements which were subject to consultation.

Stakeholder Response to the Policy Consultation and Variation Notice

1.8 Ofcom received 21 responses to the consultation of which 8 were confidential. Non confidential respondents are listed in Annex 1 of this statement and are published on Ofcom's website⁶.

1.9 The majority of respondents were in favour of Ofcom's proposals. Respondents generally recognised that there is a range of different demands for the spectrum and that the mixed management model provided a pragmatic solution to supply the appropriate authorisation approach for the different types of users. These respondents also viewed the size of the segmented blocks indicated by our proposals as adequate to support efficient exploitation of the band. No respondents supported a competitive award of the band and several expressed strong opposition.

1.10 Four respondents were not in favour of implementing Ofcom's proposals, indicating a preference for retaining the existing management approach. We have considered all the responses we received and, for the reasons set out in this statement, have decided to implement the mixed management approach as proposed in our consultation but with some minor modifications.

Implementation of Mixed Management Approach

1.11 We have decided to implement a mixed management approach as summarised in table 1 below. The extension of our existing Ofcom coordinated fixed link assignment

⁴ CEPT ECC/REC/(05)07

⁵ Consultation on the notice of variation ran from 21 August 2013 to 11 November 2013.

⁶ <http://stakeholders.ofcom.org.uk/consultations/70-80ghz-review/?showResponses=true>

tool to incorporate the 70/80 GHz band is complete; applicants will be able to apply for licences and assignment in the Ofcom coordinated part of the band from 17 December 2013.

Segment	Block Size	Frequency range	Maximum channel bandwidth	Band Plan
Self coordinated block (currently available)	2.5 GHz	73.375–75.875 GHz and 83.375-85.875 GHz	2.5 GHz	no channel plan
Ofcom coordinated Block (available from 17 December 2013)	2 GHz (limited to 1 GHz in the first instance)	71.125-73.125 GHz and 81.125-83.125 GHz	1000 MHz	CEPT band plan (ECC REC (05)07)
Spectrum separating the Self coordinated and Ofcom coordinated blocks	250 MHz	73.125-73.375 GHz and 83.125-83.375 GHz	-	-

Table 1: Details of segmented band plan

- 1.12 Interim licence fees will apply for the Ofcom coordinated block as indicated in our consultation. These fees will be subject to the forthcoming Fixed Link Fees Review; however, responding to stakeholder observations about the need for certainty, interim fees will be in place and capped for a period of 5 years following the publication of this statement. However should the Fixed Link Fees Review conclude that fees should decrease for this band, then we would propose to implement such fees in accordance with the plans indicated by the review.

Transition Arrangements for Existing Licensees

- 1.13 We are implementing temporary transition arrangements for a small number of licensees that raised concerns regarding a limited number of already purchased fixed frequency equipment, purchased before the publication of our consultation but has yet to be registered. This equipment would become non compliant under our new arrangements.

Changes to the Self Coordinated approach

- 1.14 Respondents to the consultation made a number of helpful comments on how current arrangement could be improved. We plan to examine how we might address these suggestions in developing our current solution. One key area highlighted was the benefit of making available additional parameters in the wireless telegraphy register for the self coordinated licence class and we have decided to implement these changes to the register as soon as practically possible.

Areas where further work is required and which are to be kept under review

- 1.15 Respondents to the consultation highlighted that these bands were at an early stage of their commercial exploitation and the nature of demand is likely to evolve and mature over the coming years. In our consultation we set out a number of techniques that would, as far as possible, preserve future flexibility to adapt our authorisation

arrangements to reflect the evolving pattern of use of this spectrum. In section 3 of this document we detail how we will practically implement these measures into our assignment and licensing arrangements.

- 1.16 We will also continue to monitor the pattern of use and demand in these bands. We believe our proposals contain a level flexibility that would allow us to respond to evolving demand for these bands from all stakeholders. However, should it become clear that arrangements need to be reviewed in light of developments, Ofcom may decide to do so.
- 1.17 In addition we plan to consider further:
- **Development of the Self Coordinated Licensing and Link Registration System** – respondents to the consultation made a number of useful suggestions regarding improvements to licensing arrangements in this area. We are currently examining how we might develop current arrangements to address these points.
 - **Developments in the millimetre wave bands** – we will continue to develop our understanding of the millimetre wave bands, including the associated interference environment and the models required to manage this to ensure different licence products remain fit for purpose.

Section 2

Responses to the Consultation

The Consultation

- 2.1 On 21 August 2013 Ofcom published a consultation⁷, which closed on 14 October 2013, setting out our proposals to change the way in which the spectrum between 71-76 GHz and 81-86 GHz (“70/80 GHz”) is managed in the UK following on from the Ofcom Spectrum Review⁸ work carried out last year. Up to the publication of this consultation the entire 70/80 GHz band was available in the UK and used for point to point fixed links under the self coordinated licence type.
- 2.2 The Spectrum Review conducted by Ofcom considered the management of spectrum that is used by fixed point to point links covering a range of frequency bands between 1.4 GHz and 86 GHz. The review identified a number of key priorities, of which the need to review the future management of the 70 / 80 GHz spectrum was the most urgent. This was due to the changing nature of demand for this spectrum and the recognition of the band’s potential for the deployment of high capacity, high availability 4G backhaul.
- 2.3 Under the self coordinated licensing approach, which is used to authorise links in this band, licensees have responsibility to coordinate new links with existing deployments in the band. The approach enables the use of this spectrum in a highly flexible way for point to point links, including mobile backhaul. However the Spectrum Review identified that there is a perception among some stakeholders that the self coordinated approach at 70/80 GHz does not offer the certainty that is required for the high availability (99.99% - 99.999%) applications used to support 4G networks.
- 2.4 Our consultation considered the regulatory approaches best suited to provide the most efficient and appropriate authorisation arrangements for all users of the band, taking into account the needs of both existing and potential new users. Our analysis was informed by an extensive stakeholder engagement exercise conducted prior to this consultation. We then set out our proposal to introduce a mixed management approach for the band.
- 2.5 We specifically sought views on our proposal to offer:
 - 2.5.1 A mixed solution that allows stakeholders to choose between the currently available self coordinated authorisation approach and a new Ofcom coordinated approach for the band;
 - 2.5.2 A segmented band plan with the split of 2 x 2 GHz and 2 x 2.5 GHz for Ofcom coordinated and self coordinated approaches respectively;
 - 2.5.3 250 MHz as an appropriate amount of spectrum separating the two approaches in each sub-band;
- 2.6 We also sought views on the following :

⁷ <http://stakeholders.ofcom.org.uk/consultations/70-80ghz-review/>

⁸ <http://stakeholders.ofcom.org.uk/consultations/spectrum-review/>

- 2.6.1 For the Ofcom coordinated part of the band, whether respondents agreed with our proposals to:
- a) Make available channels of 500 MHz and 250 MHz (with smaller channels being made available when the standards are completed);
 - b) Adopt an assignment approach in the Ofcom coordinated portion of the band that would allow us to test the need for the additional spectrum beyond the 1 GHz allotment available for automatic assignment.
- 2.6.2 If any aspects of the current self coordinated licensing and link registration process could benefit from improvements;
- 2.6.3 If Ofcom should consider mandating the CEPT channel plan, ECC/REC/(05)07 for the self coordinated block;
- 2.6.4 Whether the technical parameters presented on the 70/80 GHz section of the wireless telegraphy register could be changed to allow more efficient coordination.
- 2.7 As detailed in the consultation we issued a proposed notice of variation to existing licensees with licences issued up to the date of publication of the consultation, setting out our changes necessary to licences to implement our proposals and gave formal notice of proposed licence variation.
- 2.8 Having considered the outcome of this consultation and representations from the licence variation consultation, we detail in this statement our decision on the future management of this spectrum.

Impact Assessment

- 2.9 The analysis presented in this document represents an impact assessment, as defined in section 7 of the Communications Act 2003⁹ (the Act).
- 2.10 Impact assessments provide a valuable way of assessing different options for regulation and showing why the preferred option was chosen. They form part of best practice policy-making. This consultation sets out the potential impacts for stakeholders and the reasons we are making proposals for the future management of the 70 / 80 GHz spectrum.
- 2.11 Ofcom is separately required by statute to assess the potential impact of all our functions, policies, projects and practices on equality. Equality Impact Assessments (EIAs) also assist us in making sure that we are meeting our principal duty of furthering the interests of citizens and consumers regardless of their background or identity. We do not consider the impact of this decision to be to the detriment of any group within society.

Responses to the Consultation

- 2.12 In this section we identify the key elements of stakeholder feedback received during the consultation and our response. A more detailed coverage of our response is provided in Annex 2 of this document.

⁹ www.opsi.gov.uk/acts/acts2003/pdf/ukpga_20030021_en.pdf

- 2.13 Ofcom received 21 responses (8 confidential) to the policy consultation which broadly fall into the following categories:

In favour of mixed solution proposals

- 2.14 The majority of respondents were in favour of Ofcom's proposals. Respondents generally recognised that there is a range of different demands on the band and that the mixed model provided a pragmatic solution to supply the right authorisation approach for these different types of users. **Intellect** was in favour of the mixed approach as a short term solution, proposing Ofcom to consider a longer term move towards an online system of assignment for the entire band with established assignment criteria to enable self assignment.
- 2.15 Respondents also viewed the channel widths supported by our proposals as adequate to support efficient exploitation of the band. However, **EE, NEC and SIAE Microelectronica** raised the issue of requirements for wider channel sizes of 750 MHz and 1000 MHz, which they wanted made available under the Ofcom coordinated approach.
- 2.16 The majority of respondents also supported the size of the segmented blocks under each management approach, although **Aviat** and **CommScope** felt that a larger proportion should be made available for the Ofcom coordinated approach and **SIAE Microelectronica** felt that the blocks should be equal in size under each approach. Most respondents supported the pragmatic approach to make available up to 1 GHz of spectrum in the initial instance, however some raised the need to provide a degree of certainty to ensure the future availability of spectrum under the Ofcom coordinated approach.
- 2.17 While most respondents supported proposals to use 250 MHz of spectrum to separate the two blocks, a confidential respondent raised the need to provide further justification for the size of this separation and **Siklu** questioned the need for any size of separation. **Siklu** instead proposed that the 250 MHz in each sub-band should be annexed to the self coordinated portion.
- 2.18 All respondents in favour of the mixed management approach supported the implementation of the CEPT channel plan in the Ofcom coordinated block.
- 2.19 No respondents supported a competitive award of the band and several expressed strong opposition to this.

Ofcom Response

Although some respondents called for more spectrum to be assigned to the Ofcom coordinated block, the majority of respondents to the consultation broadly agreed with Ofcom's proposed segmentation of the band and felt this provided a fair balance between the needs of different groups. We believe the band segmentation proposals provide adequate access to spectrum for both enterprise and backhaul users. Due to the urgent need to access this spectrum for 4G backhaul we have taken practical measures to ensure the band is segmented as equally as possible while taking into account the majority of existing registrations.

With regard to channel sizes greater than 500 MHz in the Ofcom coordinated block, we have considered this further and detail the availability of channels up to 1 GHz in the next section. Overall there remains an uncertainty associated with future demand under either authorisation approach. In section 3 we detail how we intend to implement techniques into

our assignment and licensing approach that aim to preserve flexibility to adapt to evolving patterns of demand.

Most respondents to the consultation agreed with our proposal to use a 250 MHz block of spectrum to separate the two assignment approaches which reflects established practice to minimise the risk of interference between adjacent bands. However, we did not receive any detailed technical submissions on this measure and therefore Ofcom will keep this 250MHz separation block under review with a view to reducing its size should it prove technically possible to do so in the future. In the interim period we will use this 250 MHz block of spectrum to separate the Ofcom coordinated and self coordinated blocks as a practical measure to minimise the risk of interference between the two management approaches.

In favour of retaining the existing self co-ordinated approach throughout the full band

2.20 Two responses in this category highlighted the need for wider channel bandwidths than currently supported by our proposed band plan (one confidential and the other from **UK Broadband**). Both argued that while the equipment will become more efficient over time, the channel sizes needed would not be as small as the maximum block sizes that Ofcom has proposed.

2.21 **Wireless LAN MAN** and **EuroGrid** voiced a principled objection to the introduction of an Ofcom coordinated model to the band, highlighting that the current self coordinated approach is a model which has worked well for them. They did not raise specific concerns relating to the material impact of these proposals on their plans to utilise the spectrum in the future.

Ofcom Response

While we note that some respondents wanted to retain the current self coordinated approach and felt that our proposals would not support wider channel bandwidths, this view was expressed by a limited number of respondents. By contrast, the consultation and the pre-consultation exercise have shown a clear immediate and near term demand for channel sizes that fall within the proposed segmented blocks. We believe that the proposed segmentation strikes an appropriate balance between the differing needs of potential users of the band. As set out in section 3 of this statement, we will assess the need for larger channel sizes in the Ofcom coordinated block as use of the band develops.

Respondents that generally supported our approach but highlighted transitional issues with older fixed frequency equipment

2.22 Responses in this category were in favour of the mixed management solution but sought interim arrangements to enable first generation *fixed frequency*¹⁰ equipment (which would otherwise become non-compliant under the mixed approach) to access the band. This is a specific issue of significance as the subject of fixed frequency equipment did not arise during the pre-consultation exercise.

2.23 Two licensees fell in this category. They raised concerns that under the new proposals they would be restricted in their ability to deploy fixed frequency equipment that would have been permitted under the existing regime. Their concerns related specifically to equipment purchased before the band was closed which they bought

¹⁰ Some first generation 70/80 GHz equipment is fixed in frequency of operation and for this type of equipment it is not possible to re-tune the frequency of operation to another part of the band.

with the expectation that it could be deployed (or redeployed) at that time or in the near future.

- 2.24 Both were content to transition to equipment which would support the new arrangements once existing stock or plans are completed. Instead they asked that a transition period be introduced to allow the deployment any such equipment purchased before the closure of the band.

Ofcom Response

With regards to the licensees concerned about their ability to deploy purchased but not deployed fixed frequency equipment, we have decided that it would be reasonable and appropriate to address these concerns. We are therefore implementing temporary transitional measures, restricted to those licensees who raised these concerns, which are designed to enable them to register specified equipment which had already been purchased but which had not been registered before our proposals were made.

The effectiveness of the current self coordinated approach

- 2.25 Respondents were generally supportive of the self coordinated model as a flexible and light touch authorisation regime but highlighted a number of areas where the approach and its implementation could be improved such as the introduction of a more robust online tool to enable self registration and the requirement for additional information in the wireless telegraphy register to support self coordination.

Ofcom Response

We plan to make some immediate changes to the self coordinated approach in light of the consultation and will add additional parameters on the register that would assist in self coordination, such as antenna polarisation, ETSI spectrum efficiency class and indication of whether a link is TDD or FDD.

We were grateful for stakeholder comments and suggestions on how the current self coordinated approach could be improved. We are currently examining at how we might improve current arrangements in view of this input.

Interim fee proposals for the Ofcom coordinated block

- 2.26 There were mixed views on our fees proposal for the Ofcom coordinated block. Some respondents sought a decrease in the proposed fees while others suggested an increase. The need for stability regarding licence fees over a period of time was a key point that was raised, noting the interim nature of our proposals due to the upcoming Fixed Link Fees Review.

Ofcom Response

We believe that our fee proposals to derive an interim fee based on the current fee rate for the average link value in the 38 GHz band is sensible and a pragmatic approach as the 38 GHz band is the nearest band (in frequency terms) to the 70 / 80 GHz bands that is currently managed by Ofcom.

In setting out our fee proposals we indicated that we viewed them as interim and subject to review as part of a wider review of fixed link fees. However, we note issues raised by stakeholders regarding the need for stability in our fees. Consequently the interim fees will apply for a period of 5 years from the date of publication of this statement irrespective of the

wider review concluding that fee rates should be increased. However should the wider review result in a proposal to decrease in fees, then we would plan implement these new fee levels in conjunction with the outcome of the wider review.

2.27 A more detailed summary of responses covering the issues raised in relation to the proposals, and Ofcom's response to each of these can be found in Annex 2.

Next steps

2.28 In light of the responses to the consultation we have decided to go ahead with our proposals with some slight alterations. In coming to this decision and the policy detailed in this statement, we have carefully considered all issues raised in the responses and believe that the policy developed will enable the deployment of fixed links in a manner that will enable both existing users and intended new users of the band in the most pragmatic way. Our decision is described in more detail in the next section.

Section 3

Ofcom’s Decision and Details of Authorisation Procedures

Introducing a mixed management approach

3.1 Having carefully considered all responses made to us as part of this review we confirm our decision to implement a mixed management approach broadly as proposed in our consultation. Figure 1 shows the segmented band plan with the following allocation:

- **Ofcom coordinated approach:** 2 x 2 GHz
- **Self coordinated approach:** 2 x 2.5 GHz

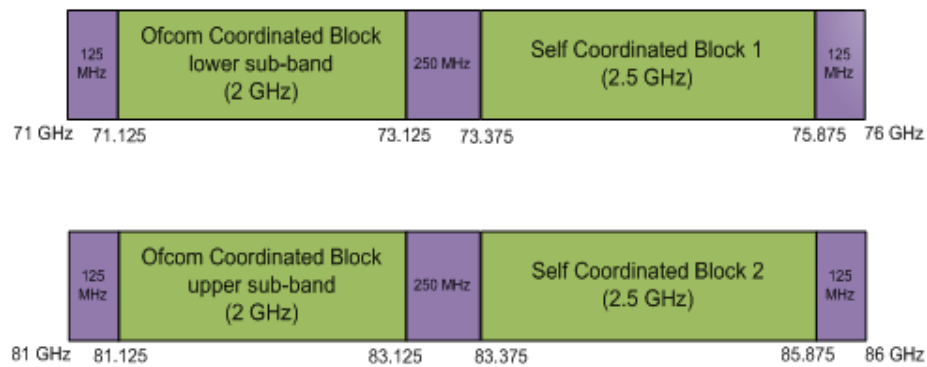


Figure 2: Mixed Management Plan

3.2 We will initially separate the two management approaches with 2x250 MHz of spectrum. However in light of the points made by some respondents to the consultation regarding this issue, we agree that the size of this separation should be kept under review and further considered when more technical evidence is available with a view to possibly reducing the size of the separation in the future.

Spectrum and Authorisation procedures for the Ofcom coordinated approach

3.3 We are implementing a detailed plan for the Ofcom coordinated block in accordance with the cross band duplexed CEPT channel arrangement (ECC/REC/(05)07) shown in figure 3 where in the initial instance we propose to make the following channels available:

- 4 paired 250 MHz channels,
- 2 paired 500 MHz channels,
- 1 paired 750 MHz channel and

- 1 paired 1000 MHz channel.
- 3.4 As explained in our consultation, we will apply an assignment approach in the Ofcom coordinated portion of the band that would allow us to test the need for the additional channels to be assigned in excess of 1 GHz. In particular, we will apply an assignment algorithm which allocates channels progressively from the bottom of the band. The algorithm will be able to make assignments automatically within the first 1GHz of spectrum; but it will require active intervention by Ofcom to open up the second tranche of 1 GHz within the assignment tool and so make the full 2 x 2 GHz available for assignment. In this way, we will be alerted if and when a request is made that would push above the initial 1GHz threshold for automatic assignment. It may well be appropriate to assign and licence the link as requested. However, this approach allows us to examine the position before doing so.
- 3.5 We do not plan to accommodate channel sizes in excess of 1 GHz at this time in the Ofcom coordinated block. Such a change would require revision of the technical frequency assignment criteria, and in line with established procedure, we would not implement such a change without further discussion with stakeholders through the Fixed Wireless Industry Liaison Forum. However we do plan to make available paired channels smaller than 250 MHz (8 paired 125 MHz and 16 paired 62.5 MHz channels) when relevant standards have been agreed.

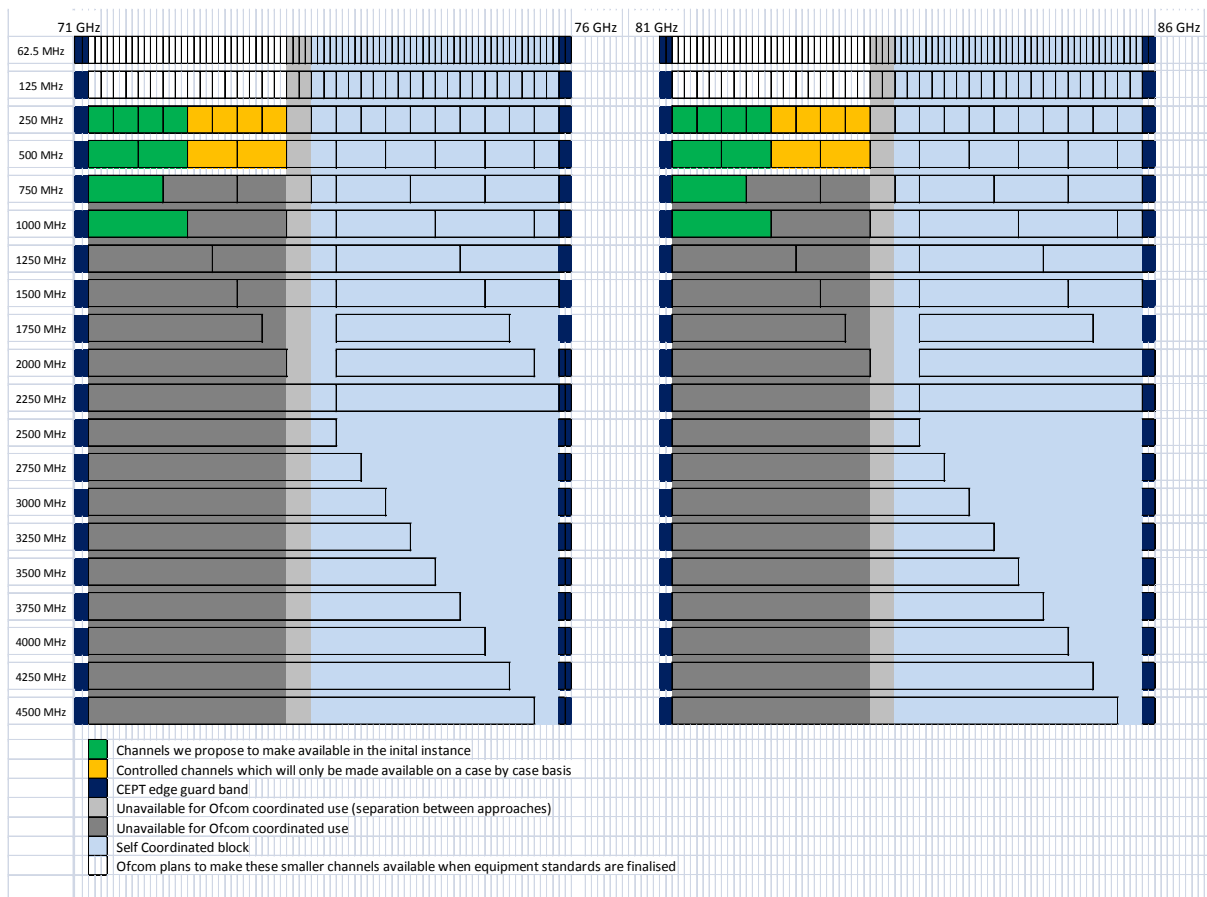


Figure 3: Channel diagram showing channels in green that would initially be made available in the Ofcom coordinated block

Frequency Assignment Methodology

- 3.6 Ofcom uses a classical noise-limited frequency assignment methodology and a description of this well established approach is set out in OfW446¹¹, Technical Frequency Assignment Criteria (“TFAC”) for Fixed Point-to-Point Radio Services with Digital Modulation published by Ofcom.
- 3.7 We have updated the TFAC to facilitate the new arrangements for the Ofcom coordinated block. Ofcom has extended the current frequency assignment service to 71.125-73.125 GHz and 81.125-83.125 GHz without making changes to the methodology or the associated technical policy unless where it has been necessary. We also have considered some issues as detailed in our consultation such as propagation modelling and the preparation of data associated with self coordinated links.
- 3.8 The approach that we have implemented is very practical and allows Ofcom to facilitate a frequency assignment service within a short timescale while managing the interference environment and minimising the risk of interference between assigned links. In taking this approach it is recognised that there may be a future requirement to update the different propagation models and associated configurations when results of further propagation studies and research in this area becomes available.

Data Preparation

- 3.9 Ofcom’s decision requires that an Ofcom coordinated solution takes account of existing fixed link deployments registered under the self coordinated regime. Candidate links exposed to Ofcom’s frequency assignment procedures under an Ofcom coordinated solution have been modelled in the radio interference environment and, in order for a frequency to be assigned, W/U protection ratios would need to be satisfied at all of the receivers considered in the frequency assignment procedure, including receivers associated with self coordinated links.
- 3.10 Some practical steps have been necessary, which we detailed in our consultation, in order that the data on the register of self coordinated links could be migrated to Ofcom’s frequency assignment database and to ensure that these links were accurately modelled in the technical calculations in accordance with Ofcom’s frequency assignment methodology and procedures.

Licensing

- 3.11 Each link will require a point to point fixed link licence which will be issued following successful assignment. The licence will be of the same type, and subject to the same standard terms and conditions¹² as applied to other Ofcom coordinated fixed link bands.

Fees

- 3.12 As indicated in the previous section, there were mixed views on our fees proposal for the Ofcom coordinated block. Some respondents sought a decrease in fees proposed while others suggested an increase. The need for stability regarding licence fees over a period of time was a key point that was raised, noting the interim nature of our proposals due to the upcoming Fixed Link Fees Review.

¹¹ <http://licensing.ofcom.org.uk/binaries/spectrum/fixed-terrestrial-links/guidance-for-licensees/tfac/ofw446.pdf>

¹² http://licensing.ofcom.org.uk/binaries/spectrum/regulations-technical-reference/General_Licence_Conditions.pdf

- 3.13 Noting the above, we will therefore apply the interim fees, which will be fixed for a period of 5 years from the date of publication of this statement irrespective of any upward change from the Fixed Link Fee review. However should the Fixed Link Fees Review result in a decrease in annual fees, then we would transition to the new fees regime as developed by the fees review.
- 3.14 The interim fee levels for Ofcom coordinated links in the 70/80 GHz band are as follows with pro-rated fees applying for the 750 MHz and 1000 MHz channels as indicated in our consultation. Pro-rated fees would apply to any further channels larger than 1000 MHz should we make these available before the Fixed Link Fee Review.

Channel Size ranges (MHz)	Pro-rated Interim Fee
<250	£100
250	£225
500	£450
750	£675
1000	£900

Authorisation procedures for the self coordinated approach

- 3.15 We have decided to retain the self coordinated approach in the 2 x 2.5 GHz of paired spectrum in the upper half of each block as shown in figure 2 with the existing rules continuing to apply as now. In particular:
- We are not planning to constrain assignments so that they must fit a channel plan in this part of the band. The consultation has not resulted in a clear need for implementing a channel plan with some respondents not in favour of such an approach.
 - The existing fee structure will remain in place for now (although self coordinated links, like all fixed link licence products, will be subject to the forthcoming Fixed Link Fee Review).
 - We will continue to maintain a publicly available register of fixed links and are currently considering further developments to the process. We will engage with stakeholders via the Fixed Wireless Industry Liaison Forum to inform them of further developments in this area.
- 3.16 All registered technical link parameters are made publicly available on the 70 / 80 GHz section of the Wireless Telegraphy Register to facilitate coordination. Based on stakeholder responses, the following parameters will now be requested for new registrations for the self coordinated licence class (and as an option for older registered links):
- Indication of link Polarisation (Horizontal, Vertical, Dual);

- Indication of ETSI Spectral Efficiency Class;
- Indication of whether the link would operate in Time Division Duplex or Frequency Division Duplex mode.

Transitional arrangements for licensees of non compliant equipment

3.17 In the previous section we referred to some licensees that had made representations to Ofcom as part of the licence variation exercise regarding fixed frequency equipment that they had purchased but that had yet to be registered at the time of publication of Ofcom’s proposals. By making our decision to implement our proposals, these licensees would no longer be able to deploy their purchased equipment as a result of it becoming non-compliant under Ofcom’s new rules. Without prior visibility of this fixed frequency issue, Ofcom has decided to engage with these licensees individually to consider, in a temporary transitional period, the co-ordination and registration of limited numbers of purchased fixed frequency equipment not-compliant with the new arrangements. The transitional arrangements will be in place for a period of 12 months from the publication of this statement.

Summary of Decision

3.18 The table below provides a summary of our decision:

Table 3: Summary of Decision

Decision	Detail
<p>We are implementing a mixed solution where separate frequency allotments are made to the self coordinated and Ofcom coordinated approaches.</p>	<p>Our decision for the distribution of the available spectrum is set out in the above sub sections.</p> <p>In summary this would involve:</p> <ul style="list-style-type: none"> • The band 71.125 – 73.125 GHz and 81.125 – 83.125 GHz would be made available under an Ofcom coordinated approach. Although initially only the first 1 GHz of spectrum would be available for automatic assignment. Active intervention will be made by Ofcom if channels are required in the second 1GHz tranche within this 2 x 2 GHz block. • The band 73.375 – 75.875 GHz and 83.375 – 85.875 GHz would remain available to the self coordinated licence type. • We are initially introducing 250 MHz to separate each block at 73.125-73.375 GHz and 83.125-83.375 GHz as a practical measure to avoid co channel interference between the two approaches and minimise adjacent channel interference. We propose to study this further with a view to reducing its

Decision	Detail
<p>For the Ofcom coordinated approach only the first 2 x 1 GHz of spectrum would initially be available for assignment on an automatic basis via our assignment tools. The further 1GHz (of the 2 GHz total) in each sub band could be made available after consideration of relevant assignment requests.</p>	<p>size in the future.</p> <p>Channels available for automatic assignment (within 71.125-72.125 GHz paired with 81.125- 82.125 GHz) in the first instance:</p> <ul style="list-style-type: none"> 1x 1000 MHz 1x 750 MHz 2x 500 MHz 4x 250 MHz 8 x 125 MHz (when standards are complete) 16 x 62.5 GHz (when standards are complete) <p>Note that we are not intending to make additional channels of 750 MHz or 1000 MHz available without engaging in further stakeholder discussion through the Fixed Wireless Industry Liaison Forum should the need arise.</p>
<p>We propose to facilitate the introduction of an Ofcom coordinated approach to the band by effectively extending our existing fixed point to point link Licence product to the band.</p>	<p>We will introduce a channel plan based upon the CEPT model.</p> <p>The technical assignment criteria for the band is based on our existing approach applied to other bands but appropriately modified to reflect the frequency band as detailed above.</p>
<p>Registered links can continue to operate in spectrum no longer available to the self coordinated approach and will be taken into account in our assignment analysis. However, no new self coordinated link registrations will be permitted in the Ofcom coordinated portion of the band.</p>	<p>Existing self coordinated links registered before 21st August will be permitted to continue operation and have been accounted for should they overlap or fall within the proposed Ofcom coordinated block and/or the spectrum separating the two approaches.</p> <p>Temporary transition arrangements will apply for those licensees that have made representation to Ofcom as part of the licence variation consultation, for a period of 12 months from the publication of this statement.</p>
<p>Additional parameters on the register to assist self coordination and further developments of the approach</p>	<p>In order to improve the self coordinated approach the following parameters will be requested for all new self coordinated registrations:</p> <ul style="list-style-type: none"> • Polarisation (options are horizontal, vertical and dual) • ETSI Spectrum Efficiency Class • Whether the link will operate in TDD or FDD mode.
<p>Fees</p>	<p>All fees will be subject to the Fixed Link Fees Review. Interim fees will therefore apply for the Ofcom coordinated block as follows:</p>

Decision	Detail
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Channel Size ranges (MHz)	Pro-rated Interim Fee
<250	£100
250	£225
500	£450
750	£675
1000	£900

The interim fee rate will apply and capped for a period of 5 years following the publication of this Statement. Should the Fixed Link Fee Review result in a reduction of fees then these will be implemented as indicated by the fees review.

The existing fee structure for the self coordinated approach will remain in place. This will also be subject to the Fixed Link Fee Review.

Annex 1

List of non-confidential respondents

Aviat Networks

British Telecommunications plc.

CommScope

EuroGrid Inc.

Everything Everywhere Ltd.

Federation of Communication Services

Intellect

NEC

SIAE Microelectronica SpA

Siklu Communication Ltd.

UK Broadband

Vodafone Ltd.

Wireless LAN MAN

Annex 2

Issues raised in responses to Ofcom consultation

Question 1: <i>Do you have any additional information to provide to that presented in this Consultation that you believe Ofcom should consider? If so please provide clearly evidenced views. Are there any other issues that you believe Ofcom should have considered?</i>	
Issue Raised	Ofcom Response
<p>UK Broadband and a confidential respondent expressed concerns that the current proposals have overlooked high speed data rates (for instance greater than 3 Gbps) which currently require around 4.5 GHz channels to operate.</p>	<p>While this concern was expressed by two of the respondents to the consultation, our proposals reflect the clear and immediate demand from other stakeholders for channels that fall within the proposed segmented blocks. We will also continue to monitor the pattern of use and demand in these bands. We believe our proposals contain a level flexibility that would allow us to respond to evolving demand for these bands from all stakeholders. However, should it become clear that arrangements need to be reviewed in light of developments, Ofcom may decide to do so.</p>
<p>A confidential respondent argued that the risk of interference in an entirely self coordinated band has been exaggerated and UK Broadband also responded that interference was unlikely to be an issue in practice.</p>	<p>Although some respondents felt fears of interference were exaggerated, this review has also indicated clear demands for high availability links from other stakeholders, and in order to meet these demands a high quality frequency assignment service is needed. However, we intend to develop and evolve the detail of our approach to management of these high frequency bands to ensure that are assignment approach remains efficient and meets the evolving needs of stakeholders.</p>
<p>Aviat and CommScope both felt that insufficient consideration was given to equipment innovation which could enable street level use.</p>	<p>Ofcom's proposals do not preclude the use of street level equipment. Instead this review requested information regarding the requirement of street level links under the Ofcom coordinated approach. The information presented to us has indicated that street level links would largely be facilitated within the nearby 57-64 GHz band (7 GHz BW available) or within the 64-66 GHz band (2 GHz BW available) rather than in the 70 to 80 GHz band.</p>
<p>SIAE Microelectronica commented that as</p>	<p>At this stage we plan to permit all spectrum</p>

<p>the Ofcom coordinated block is intended for high capacity/ density links then only higher efficiency equipment should be permitted. They suggest only equipment which is a minimum of ETSI class 2 should be allowed to operate in this block.</p>	<p>efficiency classes unless or until there is a need for us to review this policy.</p>
<p>Several stakeholders responded that the proposed level of interim fees needs further consideration. A confidential respondent felt that the fees were too low and anticompetitive, while Vodafone, EE and Siklu saw them as too high and based on the unsuitable parameters. It was suggested that the interim fees for 70/80 GHz band should be based on the 55 GHz band rather than the 38 GHz band. Siklu also felt that as most links would occupy at least 500 MHz channels in the near future then the proposed fee of £450 was very high.</p>	<p>While Ofcom agrees that the level of fees need further consideration, we believe that this would be best addressed by the Fixed Link Fees Review, which is due to be held next year. In light of this upcoming review, we believe that deriving fees for this band based on the nearest Ofcom coordinated fixed link band in use is the most pragmatic approach to take for the interim period. If the Fixed Link Fee Review substantially increases fees we will adopt an approach to apply the interim fees for a fixed period (5 years). However should the review result in a reduction in fees then Ofcom would implement new fees as intended.</p>
<p>Wireless LAN MAN objected to any use of auctions in allocating this spectrum. They argued that Ofcom has not taken into account the detrimental effect this would have on smaller users.</p>	<p>Ofcom recognises that block allocation of spectrum in this band through an award could limit access to it for a wide group of stakeholders. This approach may therefore be particularly unsuitable for the enterprise market, although awarding rights through an auction could potentially be a way of addressing demand for links with higher quality of service management. However, we do not plan to conduct an auction of this spectrum at this time as there was no support for one in responses to the consultation. Instead quality concerns are addressed through the introduction of an Ofcom coordinated approach to authorising links in the lower half of the band, while maintenance of the existing light-licensing approach in the upper half of the band should enable continued access for smaller users.</p>
<p>Vodafone cautioned that as industrial scale usage of the band would be unlikely to happen until there is pricing certainty, a review of the band management approach for 70/80 GHz should not be conducted for at least 3 years.</p>	<p>Respondent to the consultation highlighted that these bands were at an early stage of their commercial exploitation and the nature of demand is likely to evolve and mature over the coming years. In our consultation we set out a number of techniques that would, as far as possible, preserve future flexibility to adapt our authorisation arrangements to reflect the evolving pattern of use of this spectrum. In section 3 of this</p>

	<p>document we detail how we will practically implement these measures into our assignment and licensing arrangements. We will also continue to monitor the pattern of use and demand in these bands. We believe our proposals contain a level flexibility that would allow us to respond to evolving demand for these bands from all stakeholders. However, should it become clear that arrangements need to be reviewed in light of developments, Ofcom may decide to do so.</p>
<p>Siklu felt that TDD should be permitted in the Ofcom coordinated part of the band alongside FDD as this would increase spectrum efficiency.</p>	<p>FDD and TDD solutions are both permitted in the self coordinated block. For the Ofcom coordinated block, potential users only indicated a requirement for an FDD solution. Demand for TDD access is low and Ofcom's fixed link frequency assignment service is therefore only designed to support the use of conventional FDD. The service is in line with professional practice and this review has not demonstrated a strong demand for TDD solutions in the Ofcom coordinated block.</p>
<p>A confidential respondent responded that compensation should be provided by Ofcom to companies which were unable to deploy links for non compliant equipment purchased before the band was closed.</p>	<p>Ofcom recognises the potential impact our proposals could have on companies in this position, and we have therefore implemented transitional arrangements for those existing licensees who have raised this concern, to enable them to register any such equipment under legacy arrangements.</p>
<p>EuroGrid raised the issue of licensees being granted preferential licences for the Ofcom coordinated block based on their reason for using the spectrum. They commented that backhaul users should not be given precedence in this band over enterprise users.</p>	<p>Although there is a practical need for different management approaches of spectrum to meet demands for both enterprise and backhaul use, we do not plan to restrict the use of either block to specific applications. Links will be assigned on a first-come first-served basis, as for all Ofcom-managed fixed links licence categories.</p>

Question 2:

2a) Do you agree with our proposals to offer a mixed solution that allows stakeholders to choose between the currently available self coordinated authorisation approach and a new Ofcom coordinated approach for the band?

Issue Raised	Ofcom Response
<p>EuroGrid felt licensees of grandfathered links should have flexibility to vary their links without losing priority and wanted guaranteed access to the Ofcom coordinated block and the guard band for grandfathered links.</p>	<p>Under the self coordinated system new registrations must not interfere with existing links on the register and so variation of links is not permitted. If an operator wishes to make technical changes to a link, this is material to the interference environment and therefore the registration must be cancelled and a new one submitted because this would be material to the interference assessment of that link. Similarly new Ofcom coordinated links would need to be coordinated with grandfathered links. If grandfathered links in the Ofcom coordinated block require modification, they would need to be cancelled and a new request for frequency assignment subject to the Ofcom coordinated rules would have to be submitted. We have made some modifications to grandfathered link data; however this was done to ensure that data is complete and consistent with Ofcom's approach the frequency assignment.</p>
<p>EE had residual concerns about the impact of potentially large bandwidth self coordinated links on coordinated systems. They suggested that Ofcom undertake a study of the dynamics of possible interference and publish this as part of the consultation response.</p>	<p>The Ofcom coordinated approach requires detailed modelling of the radio interference environment, including incidences of interference to receivers from adjacent channels. This would require a level of detailed study which we are proposing to consider when reviewing the allocation of spectrum to separate the Ofcom coordinated and self coordinated blocks.</p>
<p>Intellect would want Ofcom to consider an online assignment and licensing approach as a long term solution. They feel that using Ofcom's assignment criteria would remove the need for a band partition.</p>	<p>The band segmented approach was proposed as a result of the urgent demand from backhaul users to be able to confidently use the 70/80 GHz band and the need to balance the interests of stakeholders through regulatory solutions. However in the longer term we plan to continue to review the demand for this spectrum and review our proposed approach in light of further evidence.</p>
<p><i>2b) Do you agree with the segmented band plan with the split of 2 x 2 GHz and 2 x 2.5 GHz for Ofcom coordinated and self coordinated approaches respectively?</i></p>	

<p>Aviat, CommScope and SIAE Microelectronica all felt that a larger portion of the 70/80 GHz band should be made available under the Ofcom coordinated approach, whilst several other respondents including EuroGrid and UK Broadband preferred that the entire band remain self coordinated.</p>	<p>The majority of respondents to the consultation broadly agreed with Ofcom's proposed segmentation of the band and felt this provided a fair balance between the needs of different groups. We believe the band segmentation proposals provide adequate access to spectrum for both enterprise and backhaul users. Due to the urgent need to access this spectrum for 4G backhaul we have taken practical measures to ensure the band is segmented as equally as possible while taking into account the majority of existing registrations. As indicated above, we will also continue to monitor the pattern of use and demand in these bands. We believe our proposals contain a level flexibility that would allow us to respond to evolving demand for these bands from all stakeholders. However, should it become clear that arrangements need to be reviewed in light of developments, Ofcom may decide to do so.</p>
<p>EE commented that a minimum 2x2 GHz block should be allocated to Ofcom coordinated spectrum in order to enable sufficient diversity at busy sites. They argued that a smaller portion would undermine confidence in long term use of the band.</p>	<p>Our band plan identifies 2x2 GHz for the Ofcom coordinated block. As detailed in section 3 we have adopted an assignment approach which requires active intervention beyond 2x1 GHz of the block which strikes the right balance to manage the uncertainty associated with demand in this band.</p>
<p><i>2c) Is the guard band size of 250 MHz considered appropriate between the two approaches?</i></p>	
<p>Several respondents wanted Ofcom to provide a technical justification for the use of 250 MHz to separate the different management approaches. As part of the consultation we sought views on the size of this proposed allocation of spectrum. Siklu, UK Broadband and a confidential respondent questioned the technical justification for this spectrum, with some arguing that it was irrelevant due to the low risk of interference in this band.</p>	<p>As indicated in the statement most respondents to the consultation agreed with our proposal to use a 250 MHz block of spectrum to separate the two assignment approaches which reflects established practice to minimise the risk of interference between adjacent bands. However, we did not receive any detailed technical submissions on this measure and therefore Ofcom will keep this 250MHz separation block under review with a view to reducing its size should it prove technically possible in the future to do so. In the interim period we will use this 250 MHz block of spectrum to separate the Ofcom coordinated and self coordinated blocks as a practical measure to minimise the risk of interference between the two management approaches.</p>
<p>Siklu argued that a 250 MHz of spectrum to separate the two blocks was not required</p>	<p>See response above.</p>

<p>and therefore the spectrum allocated to it should be annexed to self coordinated block.</p>	
<p>EE commented that Ofcom should investigate whether a softer assignment approach should be implemented to separate high and low bandwidth links.</p>	<p>Ofcom has applied this approach in the 18 GHz microwave fixed link band. This is done to mitigate inequalities between radio systems with the aim of reducing assignment difficulty, so enabling a higher density of fixed links. While separating different modulation types in the 18 GHz band is appropriate, there is not enough spectrum in the 70/80 GHz Ofcom coordinated block to facilitate such an approach. Furthermore, due to the uncertainty of demand for the Ofcom coordinated block at this point in time, we consider that systematically assigning links from the bottom of the band upwards is the most appropriate approach to take.</p>

<p><i>Question 3:</i> a) For the Ofcom coordinated part of the band, do you agree with the proposal to make available channels of 500 MHz and 250 MHz (with smaller channels being made available when the standards are completed) and to make these channels available in up to 1 GHz bandwidth in the first instance?</p>	
Issue Raised	Ofcom Response
<p>SIAE Microelectronica believe that as wider channels (250 MHz or more) are specifically described as being initially available in the lowermost part of the band then smaller sub-channels should be initially considered in the uppermost part of the Ofcom coordinated block.</p>	<p>As indicated above, Ofcom has applied this approach in the 18 GHz microwave fixed link band to enable a higher density of fixed links. While there are benefits to separating different modulation types, there is not enough spectrum in the 70/80 GHz Ofcom coordinated block to practically facilitate this and it would further segment the band. In addition, due to the uncertainty of demand for the Ofcom coordinated block at this point in time, we feel that systematically assigning links from the bottom of the band upwards is the most appropriate approach to take.</p>
<p><i>b) Is there a requirement for channel sizes greater than 500 MHz in the coordinated block?</i></p>	
<p>Eurogrid, NEC, SIAE Microelectronica, EE, UK Broadband and several confidential respondents replied that wider channels should be made available in the Ofcom coordinated block, including channel sizes of 750 MHz and 1 GHz to enable the use of first generation and currently available equipment.</p>	<p>In light of the responses to the consultation, we are implementing the introduction of one paired 750 MHz channel and one paired 1000 MHz channel. We will continue to monitor the demand for these wider channels, however at this stage we are not intending to make additional channels of these sizes available without engaging in further stakeholder discussion through the Fixed Wireless Industry Liaison Forum should the need arise.</p>
<p>Several respondents felt that contiguous channels should be able to concatenate, either up to 1 GHz (CommScope), 2 GHz (Aviat) or 4.5 GHz (EuroGrid) of spectrum.</p>	<p>Channel rasters have been defined by CEPT for the whole of the frequency band, and therefore concatenation will not be permitted. Ofcom will assign channels up to the agreed maximum and will consider wider channel rasters to be made available based on demand. Frequency assignment is based on well defined channel sets and the service that Ofcom offers relies on precise modelling. If a channel raster is defined by CEPT then we expect to make it available within the defined Ofcom coordinated block and based on demand.</p>

<p><i>Question 4:</i> <i>a) Are there any aspects of the current self coordinated licensing and link registration process that could benefit from improvements?</i></p>	
<p>Issue Raised</p>	<p>Ofcom Response</p>
<p>EuroGrid, EE, SIAE Microelectronica, Siklu and a confidential respondent commented that the self coordinated solution should be upgraded to provide an online facility. An automated system was suggested, similar to the American approach.</p>	<p>We will consider this policy as part of our improvement plans for the self coordinated solution.</p>
<p>EuroGrid, Aviat and a confidential respondent noted the problem of links being registered but not built on later. They felt that mandatory construction and deployment of links should be implemented to prevent this, for instance within a 12 month time period of registration.</p>	<p>This is a broader licensing issue that is not limited to the 70/80 GHz band. However we have noted this concern.</p>
<p><i>b) Should Ofcom consider mandating the CEPT channel plan, ECC/REC/(05)07 for the self coordinate block?</i></p>	
<p>The FCS, EuroGrid and two confidential respondents replied that the CEPT channel plan should not be implemented in the self coordinated block.</p>	<p>At this point in time, Ofcom will not introduce a channel plan for the self coordinated block. We consider that there is insufficient justification to support the implementation of the channel plan for the self coordinated portion and that the non channelised highly flexible approach is still valid for the lighter self coordinated approach.</p>
<p><i>c) Are the technical parameters shown on the register sufficient to enable self coordination? Should Ofcom consider presenting additional parameters on the register? If so, which parameters and why?</i></p>	
<p>EE, Siklu and EuroGrid all recommended that polarisation be added to the parameter list to enable the re-use of frequency channels without mutual interference.</p>	<p>Ofcom agrees that polarisation should be added to the parameter list and we will include this as an additional requirement for new self coordinated links. We will ask all licensees with legacy links to volunteer this information and the other additional parameters for their existing links.</p>
<p>EE felt that the ETSI spectrum efficiency class should be added to the parameter list to enable better assessment of likely interference.</p>	<p>We agree with this suggestion and have added ETSI spectrum efficiency class to the parameter list. As indicated above we will ask all licensees with legacy links to volunteer this information and the other additional parameters for their existing links.</p>