



Freedom4 application for licence variation

This document sets out Ofcom's decision on
Freedom4's request to vary its Wireless Telegraphy
3.6 GHz licence

Statement

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Contents

Section		Page
1	Executive summary	2
2	Background to this statement	5
3	Assessment of the licence variation and responses to the consultation	7
4	Decisions and next steps	20
Annex		Page
1	List of responses received	21
2	Summary of responses to the consultation	22

Section 1

Executive summary

- 1.1 This document sets out Ofcom's decision on the request from Freedom4 Limited ('Freedom4') to vary its Wireless Telegraphy Fixed Wireless Access 3.6 to 4.2 GHz licence (the 'Freedom4 licence') in two ways:
- to increase the central station maximum power; and
 - to remove the requirement to coordinate low-power terminals and allow them to be used for providing mobile services.

Consultation on Freedom4's application for licence variation

- 1.2 On 9 June 2009 we published a consultation document¹ (the 'consultation') assessing Freedom4's request and seeking comments from stakeholders on the issues raised.
- 1.3 The main points of our assessment were:
- the Freedom4 licence did not limit the technologies it may use but did limit the applications to fixed use only;
 - there appeared to be no reason to refuse the variation of the Freedom4 licence to remove the limitation to fixed applications;
 - it would be appropriate to increase the maximum in-band power level to +23 dBW/MHz (53 dBm/MHz) for central stations and to remove the absolute limit of +22 dBW/MHz (eirp);
 - coordination should not be necessary for terminal stations with a spectral density not exceeding 25 dBm/MHz and total eirp not exceeding 30 dBm unless a proposed central station was within 100 MHz and 2km of a point-to-point link; and
 - we noted Freedom4's preference not to vary the out of block emission limits in its current licence and considered that by maintaining the current block edge mask there was no change in the interference environment for adjacent services. However, with the introduction of mobile terminals there was a need to ensure sufficient separation in frequency from adjacent services. We proposed terminal station out of block emission limits to achieve this.
- 1.4 Our initial view was that subject to the outcome of the consultation the variation should be made as soon as practicable. We asked for written views and comments on the issues raised in the consultation to be made by 20 July 2009.

¹ <http://www.ofcom.org.uk/consult/condocs/freedom4/>

Responses to the consultation

- 1.5 We received 15 responses, one of which was submitted on a confidential basis and one which had a confidential annex.
- 1.6 The majority of responses (nine) were from various organisations within the satellite community. All objected to the variation request. They were primarily concerned about the adequacy of the coordination arrangements, particularly in respect of mobile terminals. Some noted that the technical conditions in European Commission Decision 2008/411/EC (the 'Decision')² extend only up to 3.8 GHz.
- 1.7 T-Mobile and one confidential respondent opposed the variation for a variety of reasons, making the point that the variation should not be made before we had clarified the position on the liberalisation of conditions in 2G and 3G licences. Another mobile network operator O2 supported the proposal to vary the licence, and it noted possible parallels for our consultation on the application of liberalisation to the mobile sector.
- 1.8 Samsung Electronics supported the proposal to vary the licence. BT had no objection in principle to the variation subject to our clarifying some points. It noted also that a subsequent review of Administered Incentive Pricing after the Strategic Review of Spectrum Pricing consultation (<http://www.ofcom.org.uk/radiocomms/ifi/srsp/>) should include other users in the bands.
- 1.9 UK Broadband supported our granting the variation request. It also said that to avoid discrimination all licences in the 3.4 to 3.8 GHz band should have similar licence conditions.

Ofcom's decision

- 1.10 We have carefully considered all responses received. The main conclusions of our consideration are that if the proposed variation were made:
 - consumers could benefit from the increased choice and competition that would follow from Freedom4's ability to offer a wider variety of services and Freedom4 would be able to make better use of the spectrum in responding to new consumer demands;
 - competition in the mobile communications market is unlikely to be distorted and competition in the provision of broadband data services is likely to be enhanced;
 - there would be no disproportionate reduction in the spectrum quality of adjacent users under the coordination procedure, i.e. Fixed Services (FS) and Fixed Satellite Services (FSS) in the 3.6 to 4.2 GHz band; and
 - the variation would be consistent with the European harmonisation of the 3.4 to 3.8 GHz bands for broadband wireless services in the Decision.
- 1.11 We consider that the continuation of the restriction on mobile use in the Freedom4 licence is not justified and our assessment of responses suggests that there are no compelling reasons not to vary the licence as proposed in the

² <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:144:0077:0081:EN:PDF>

consultation. We have therefore decided to vary the Freedom4 licence as proposed. As soon as practicable we will issue a revised licence to Freedom4.

Matters covered in this document

1.12 This document is structured as follows

- Section 2 summarises the main features of the Freedom4 licence and its licence variation request, our assessment of its request in the consultation and the responses to the consultation.
- Section 3 considers the major issues that different parties raised in responses to the consultation. In relation to each issue we summarise the responses and set out our analysis and conclusion.
- Section 4 sets out our decision on the Freedom4 licence variation request.
- Annex 1 lists the names of all non-confidential respondents.
- Annex 2 sets out our assessment of other significant responses.

Section 2

Background to this statement

- 2.1 This section summarises the main features of the Freedom4 licence and its licence variation request, our assessment of its request in the consultation and the responses to the consultation.

Freedom4 licence

- 2.2 In 2003, Pipex Communications acquired the company GX Networks which at that time held a Wireless Telegraphy Act licence for 2 x 84 MHz of spectrum in the band 3.6 to 4.2 GHz. GX Networks was the last in a succession of companies that had held the spectrum licence since it was initially granted in 1992 by the Radiocommunications Agency. Most had trialled Fixed Wireless Access technology but had not developed commercial services in the band.
- 2.3 The licence authorises the establishment, installation and use of Fixed Wireless Access transceivers, within the UK³. End-user terminals which are included as part of the licensed Radio Equipment are limited to customer premises equipment. The licence also stipulates a maximum eirp of +14 dBW/MHz, though the Interface Requirement ('IR 2015')⁴ with which the licensed equipment must comply says that +21 dBW/MHz may be considered on a case-by-case basis (e.g. for backhaul purposes using narrow beam antennas).
- 2.4 In 2006 we agreed a request from Pipex to partially liberalise the licence by removing technical restrictions that limited use to FDD systems. This was consistent with our principles of liberalisation and technology neutrality, implementing the package of EC Communications Directives, and permitted Pipex to develop WiMAX technology and to roll out trial networks. In October 2007, Pipex re-branded as Freedom4 Limited.

Freedom4 licence variation request

- 2.5 Freedom4 submitted a request to us on 9 December 2008 to vary its licence in two ways:
- to increase the central station maximum power; and
 - to remove the requirement to coordinate low-power terminals and allow them to be used for providing mobile services.

Ofcom consultation on Freedom4's request

- 2.6 On 9 June 2009 we published a consultation⁵ on Freedom4's application. The consultation assessed Freedom4's request and in doing so:
- provided background information on the 3.6 GHz band and the Freedom4 licence;

³ Not including any of the Channel Islands nor the Isle of Man.

⁴ http://www.ofcom.org.uk/radiocomms/ifi/tech/interface_req/2015.pdf

⁵ <http://www.ofcom.org.uk/consult/condocs/freedom4/>

- set out our statutory and policy framework;
- considered Freedom4's request in the light of our statutory and other legal duties; and
- considered the engineering effects of increased power levels, including the potential for interference to other users.

2.7 The main points of our assessment were:

- the Freedom4 licence did not limit the technologies it may use but did limit the applications to fixed applications only;
- there appeared to be no reason for us to refuse the variation of the Freedom4 licence to remove the limitation to fixed applications;
- it would be appropriate to increase the maximum in-band power level from +14 dBW/MHz to +23 dBW/MHz (+53 dBm/MHz) for central stations and to remove the absolute limit of +22 dBW/MHz (eirp);
- coordination should not be necessary for terminal stations with a spectral density not exceeding 25 dBm/MHz and total eirp not exceeding 30 dBm unless a proposed central station was within 100 MHz and 2km of a point-to-point link; and
- we noted Freedom4's preference not to vary the out of block emission limits in its current licence and considered that by maintaining the current block edge mask there was no change in the interference environment for adjacent services. However, with the introduction of mobile terminals there was a need to ensure sufficient separation in frequency from adjacent services. We proposed terminal station out of block emission limits to achieve this.

2.8 Our initial view was that, subject to the outcome of the consultation, the variation should be made as soon as practicable.

2.9 We asked stakeholders to consider the following question when responding to the consultation:

Are there any reasonable grounds why Ofcom should not grant Freedom4's request to vary its licence as soon as practicable? If so, please explain your reasoning for this.

2.10 We asked for written views and comments on the issues raised in the consultation to be made by 20 July 2009.

2.11 We received 15 responses, one of which was submitted on a confidential basis and one which had a confidential annex. The non-confidential responses can be found on our website⁶ and those who submitted them are listed in Annex 1. The major points raised in responses are considered in the next section of this document and other significant points are summarised in the table at Annex 2.

⁶ <http://www.ofcom.org.uk/consult/condocs/freedom4/responses/>

Section 3

Assessment of the licence variation and responses to the consultation

- 3.1 In this section, we consider the major points that were raised in responses to the consultation. In order to group together the issues we have followed, where appropriate, the sequence set out in sections 5 and 6 of the consultation. These sections contained our preliminary assessment of the proposed licence variation. Where points raised do not fall neatly within that framework we have dealt with them under separate headings in this section. Annex 2 has a table that sets out other significant points raised by individual respondents and our responses to them.
- 3.2 When discussing responses we have set out our preliminary view, a summary of the responses, our analysis and then our conclusion in relation to that issue. All non-confidential responses are available on our website.
- 3.3 The headings under which we consider issues raised in responses are:
- Effects on other spectrum users of the proposed variations
 - Maximum eirp limits
 - Limits for out-of-block emissions
 - Removal of the coordination requirement for stations with a power spectral density not exceeding 25dBm/MHz
 - Coordination of base stations
 - International coordination
 - European and international regulations
 - Comparison with the variation of UK Broadband's 3.5 GHz licence
 - Potential benefits for consumers and the UK economy
 - Optimal use of spectrum
 - Impact on competition
 - Increased value of the licensed spectrum
 - Discrimination against mobile network operators
 - Timing of the licence variation
 - Administrative consistency, rationality and procedural fairness
 - Objective justification for licence conditions

- International obligations
- Variation of other Broadband Wireless Access licences
- Points for clarification

Effects on other spectrum users of the proposed variation

- 3.4 Freedom4's variation request is (i) to increase the central station maximum power and (ii) to remove the requirement to coordinate low-power terminals and allow them to be used for providing mobile services. Its current licence stipulates a maximum eirp of +14 dBW/MHz. This limit is subject to the IR 2015 with which the licensed equipment must comply; this says that +21 dBW/MHz may be considered on a case-by-case basis (e.g. for backhaul purposes using narrow beam antennas). In the consultation we considered that:
- the +23 dBW/MHz (+53 dBm/MHz) that Freedom4 had requested was appropriate for the in-block eirp for central stations and that the absolute limit of +22 dBW/MHz should be removed;
 - for terminal stations with a spectral density not exceeding 25 dBm/MHz and a maximum eirp not exceeding +30 dBm, coordination should not be necessary unless a proposed central station is within 100 MHz and 2km of a point-to-point link; and
 - permitting mobile terminals on that basis would not lead to any adverse effects on other spectrum users.
- 3.5 In the consultation we said that the users who may be affected by the variation are those who are spectrally adjacent to the spectrum licensed to Freedom4. These are UK Broadband, which is assigned spectrum in the frequency range 3400 to 3600 MHz, and satellite earth stations and fixed point-point links within and above the frequencies licensed to Freedom4.
- 3.6 In the consultation we assessed the potential impact on these users under the following headings.

Maximum eirp limits

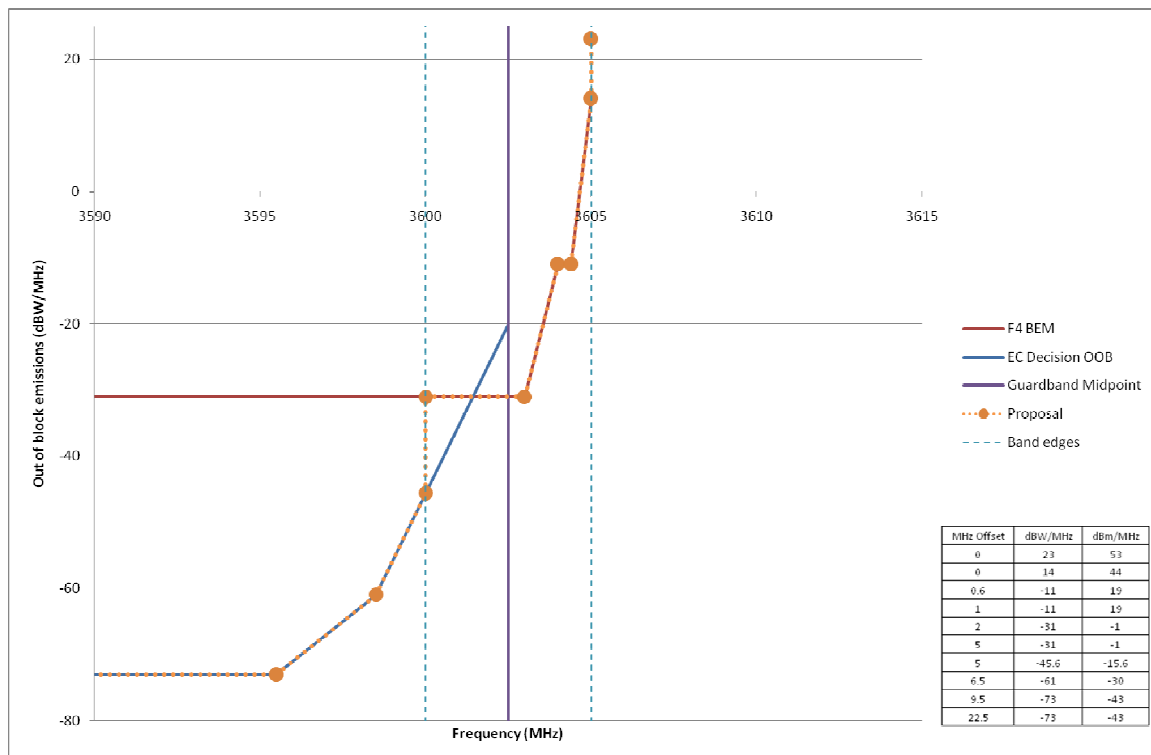
- 3.7 We recognised that an increase in power at the central station or other high power fixed terminal stations would impact other services sharing the spectrum. The coordination requirement on these stations would not change and, in our view, the current level of protection to sharing services would be maintained.
- 3.8 Four respondents believed that it was likely that receiver blocking would occur on adjacent channels and that coordination should be undertaken to avoid this, regardless of the frequency at which the earth station is currently operating. We are aware that there is a potential for Low Noise Block Downconverter (LNB) blocking. The coordination process for Freedom4 base station applications identifies where coordination with existing earth stations is necessary and compliance with this process will remain a requirement within the Freedom4 licence.

Limits for out-of-block emissions

3.9 We recognised that mobile use would change the interference environment, as it might lead to a higher density of deployment than at present and this would increase the power being transmitted into the adjacent spectrum block. With the current out-of-block emissions mask this would lead to a greater impact on neighbouring spectrum users even with the current guard bands in place.

- **Equipment operating at powers above 25dBm/MHz.** We proposed that the current out-of-block emissions should continue to apply to equipment deployed before the implementation date of the Decision for the 3.6 to 3.8 GHz band. From that date of 1 January 2012 we proposed that out-of-block limits derived from the Decision should apply to new installations, except where agreement was reached locally with other users.
- **Equipment operating at powers up to 25dBm/MHz.** If the out-of-block emission limits within the Decision for the base station were not to be applied until 5 MHz from the band edge, the possibility of terminal to terminal station interference into a neighbouring operator needed to be guarded against. We proposed that, in order to protect neighbouring users, out of block emission limits derived from the terminal station mask in EN 302 623 should apply to terminal stations.

3.10 For equipment operating at powers above 25dBm/MHz, the table in paragraph 5.24 of the consultation was incorrect although the illustration and figures in the graph were correct. The graph is reproduced below with the corrected table for the block edge mask:



MHz Offset from band edge	Maximum radiated spectral power density EIRP (dBm/MHz)
0	53
0	44
$0 < \Delta f < 0.6$	$44 - 41.67 * \Delta f$
0.6	19
1	19
$1 < \Delta f < 2$	$19 - 20 * (\Delta f - 1)$
2	-1
5	-1
5	-15.6
$5 < \Delta f < 6.5$	$-15.6 - 10.27 * (\Delta f - 5)$
6.5	-31
$6.5 < \Delta f < 9.5$	$-31 - 4 * (\Delta f - 6.5)$
≥ 9.5	-43

- 3.11 UK Broadband commented on the proposed block edge mask suggesting that “...to retain the [block edge mask] under its current licence, [Freedom4] would have a considerable cost advantage over UKB and any other operators of the Spectrum Class that have to comply with the terms of [the Decision’s block edge mask].” They also felt that the Decision’s block edge mask should be the same for all licensees in this band.
- 3.12 It is open to UK Broadband, whose block edge mask was set before the Decision was made, to seek its own licence variation. We note that the differences between the spectrum conditions between bands, including the coordination requirements in 3.6 to 4.2 GHz, may require some difference in approach to each licensee.

Removal of the coordination requirement for stations with a power spectral density not exceeding 25dBm/MHz

- 3.13 In relation to coordination with satellite earth stations sharing the band, we considered that as long as central stations and other high power terminal stations were co-ordinated there was no requirement for the coordination of terminal stations with a power spectral density not exceeding 25dBm/MHz and a total EIRP not exceeding 30dBm.
- 3.14 We said that in order to protect fixed links receivers, an exclusion zone of 2km around the fixed link path would be applied for central stations. Central stations could be deployed within these zones only after detailed coordination.

Coordination

- 3.15 Currently, for base stations that have been installed by Freedom4, coordination with fixed links in adjacent spectrum and satellite earth stations within its band

has been conducted by it submitting to us proposed new assignments, which we evaluate against the locations of existing installations using a propagation software tool.

- 3.16 We proposed that this would continue and that we would review it to consider how best to support Freedom4's network planning and reduce the administrative burden in clearing new assignment proposals.
- 3.17 Organisations within the satellite community were concerned about the adequacy of the coordination arrangements. Their main concerns were:
- Base stations should coordinate with all earth stations within 10km.
 - The coordination process should take into account the effects from mobile terminals.
 - The coordination procedure should be embedded in the Freedom4 licence.
 - Stakeholders should be consulted on the coordination procedures.
- 3.18 Concerning the issues raised in 3.17 above:
- the initial technical examination which is described in the coordination document Ofw188 uses established ITU-R calculation methods to determine the coordination area around earth stations, rather than an arbitrary distance;
 - the procedure takes mobile use into account. We consider the base station is the dominant potential interferer and where mobile terminals operate to a co-ordinated base station no further coordination is necessary for them, noting that they do not transmit when not in communication with a base station;
 - we are not changing Freedom4's obligation to coordinate with satellite earth station and fixed links operators. The detail of the procedure is not set out in the licence but compliance with this remains a condition for Freedom4's continued use of the spectrum by the condition:

"The Licensee must operate the Radio Equipment in accordance with any coordination procedure notified by Ofcom."; and
 - as the procedure uses established ITU-R calculation methods for coordination, we do not consider further consultation either necessary or appropriate.
- 3.19 The coordination process is described in the UK Spectrum Coordination Document Ofw188^[1] which is being revised in order to include a reference to mobile terminals, and for clarity. We will re-publish it in due course and thereafter review it periodically. In outline, the process is:
- Freedom4 submits applications for sites to us and we undertake an initial technical evaluation;
 - where a site fails against an existing fixed link, the application is rejected;

^[1] The current version of Ofw188 is at http://www.ofcom.org.uk/radiocomms/ifi/tech/co_docs/coordination_processes.pdf

- where a site indicates that coordination is triggered for an existing earth station, we require the Broadband Wireless Access operator to contact the relevant Fixed Satellite Service operator in order to agree any necessary coordination and mitigation measures;
 - where a site passes against the database of fixed links and also falls outside the threshold for requiring earth station coordination, the application is passed.
- 3.19 Intelsat suggested that mobile use could be limited to below 3625 MHz, where there is currently little use of satellite earth stations. We consider that the base station will be the dominant interferer and so there is no need to limit mobile operation in this way, following coordination of the base station.

Other points not considered in the consultation

- 3.20 Respondents raised a number of other points that we had not considered in the consultation. These are addressed below.

International coordination

- 3.21 Five respondents asked for a requirement to protect non-UK FSS earth stations to be included in the Freedom4 licence. We consider that for international coordination purposes the BWA central station can be treated in a similar manner to a station in the fixed service. As such, we will fulfil our international obligations as necessary and protect notified earth stations as required by ITU Radio Regulations Nos. 9.17 and 9.18.
- 3.22 Intelsat asked for the requirements of ITU Radio Regulation No. 5.430A (for the protection of FSS earth stations in neighbouring countries in the band 3.4 to 3.6 GHz), including the pfd limit at the national border, to be incorporated into the Freedom4 licence. We do not consider that this Regulation is applicable to this band. We would be happy to discuss the application of these limits within a Memorandum of Understanding (MoU) should neighbouring administrations request it. We have similar MoUs in other bands. The requirement to co-ordinate under these memoranda is covered by the general coordination clause in the licence.

European and international regulations

- 3.23 Respondents highlighted that only the lower block (3605 to 3689 MHz) of the Freedom4 spectrum was included in the Decision. This does not prevent our authorising Freedom4's use of the upper block (3925 to 4009 MHz) and it is already licensed to use the upper block. Its inclusion in the varied licence will provide greater flexibility and also facilitate use for infrastructure links, leading to greater spectrum efficiency.
- 3.24 Respondents also pointed out that in the Radio Regulations and the European Common Allocation table mobile services have a secondary allocation between 3800 and 4200 MHz, fixed services and fixed satellite services have a primary allocation. We would note that in the UK this band has been shared for some time between FSS and FS on a first come first served basis. The Freedom4 licence includes a condition that existing services, earth stations and fixed links, are protected or coordinated.

- 3.25 Schlumberger Oilfield UK pointed out that work is going on in the Radio Spectrum Committee (RSC) to ensure the protection from interference of earth stations in the band 3400 to 3800 MHz. It considered that we should not grant the variation until this work was completed. We are aware of the RSC working document (RSCOM09-31) on draft guidance to the effective implementation of the Decision. The draft guidance seeks information on FSS earth stations in the 3400 to 3800 MHz band and views on facilitating coexistence between FSS and terrestrial operators. We will be submitting comments to the RSC on the draft guidance. We do not consider that the RSC work necessitates our delaying the proposed variation to the Freedom4 licence.

Conclusion on the effects on other spectrum users of the proposed variation

- 3.26 Having considered the consultation responses and undertaken technical analysis of the potential for interference we have concluded that, noting in particular the process for coordination, there would be no disproportionate reduction in the spectrum quality of users in or adjacent to Freedom4's spectrum bands.

Comparison with the variation of UK Broadband's 3.5 GHz licence

- 3.27 Two responses, one of which was from T-Mobile and the other was confidential, considered that the Freedom4 variation raised very similar issues to the variation made to UK Broadband's 3.5 GHz licence. We consulted on this in June 2007 (the 'UK Broadband consultation') and issued a statement in November 2007 (the 'UK Broadband statement') setting out our decision to grant UK Broadband's variation request⁷. Both responses argue that we should postpone any decision on Freedom4's request until other major spectrum management decisions have been made.
- 3.28 The main arguments that T-Mobile and the other respondent made against the UK Broadband variation that may be relevant here fell under the following headings:
- Potential benefits for consumers and the UK economy
 - Optimal use of spectrum
 - Impact on competition
 - Increased value of the licensed spectrum
 - Discrimination against mobile network operators
 - Timing of the licence variation
 - Administrative consistency, rationality and procedural fairness
- 3.29 We consider each of these below, summarising the arguments made on the UK Broadband variation and our comments on them in the UK Broadband statement setting out our decision on the variation.

⁷ [UK Broadband application for licence variation | Ofcom](#)

Potential benefits for consumers and the UK economy

- 3.30 In the consultation we considered that granting a licence variation would maximise the potential for benefits to consumers from Freedom4's bringing innovative services to the market. The launch of new services was likely to increase consumer awareness of mobile and nomadic services and foster an improved understanding of the applications of recently developed technologies. This increased awareness and understanding was likely to contribute to a further increase in consumer take-up of these services, including services by other operators in the market. The new Freedom4 services could therefore help stimulate further the development and innovation of wireless broadband services in the UK.
- 3.31 In their responses to the UK Broadband consultation the two respondents were sceptical that the claimed benefits would be realised. We explained in the UK Broadband statement that that 3G operators and UK Broadband would not necessarily be offering the same services and consumers would benefit from a wider range of similar but differentiated products. Also, we considered that the removal of the 'fixed' restriction from UK Broadband's licence would provide the opportunity to launch innovative services and respond to changing market demands.

Conclusion

- 3.32 We consider that consumers could benefit from the increased choice and competition that would follow from Freedom4's ability to offer a wider variety of services if the proposed variation is made. We see no reason why it should not exploit the opportunity that the variation would offer.

Optimal use of spectrum

- 3.33 In the consultation we considered that the licence variation would allow Freedom4 to respond dynamically to changing circumstances and offer other new services without being restricted to offering a fixed service to customer premises. It wishes to exploit the advantages of emerging technologies, in particular the mobile functionality within the WiMAX protocol IEEE 802.16e which, in respect of their lower frequency range, is consistent with the Decision. This would allow Freedom4 to make optimal use of the spectrum in responding to new consumer demands.
- 3.34 Responses to the UK Broadband consultation argued that there was no convincing evidence that the licence variation would promote efficient use of the spectrum, given that mobile data services were already being offered and fixed wireless access might be a better use of UK Broadband's spectrum. In the UK Broadband statement we pointed out that this failed to recognise the contribution that UK Broadband's entry into the mobile market might make to meeting growing demand and stimulating competition. It would also be possible for UK Broadband to continue to provide fixed wireless access.

Conclusion

- 3.35 We consider that varying the Freedom4 licence on the lines proposed would enable it to introduce new services as they became technically and commercially feasible and would allow them to innovate and make optimal use of the spectrum in responding to new consumer demands.

Impact on competition

- 3.36 In the consultation we said that the 3.6 GHz band could be used to provide a number of downstream services and there was a broad range of economic markets that could be relevant when assessing the potential impact on competition of the proposed licence variation. The precise scope of the relevant economic market was an empirical one and could only be fully addressed once relevant services were being offered and consumers' and suppliers' behaviour observed. We identified three potential candidate markets for the assessment of possible competition impacts. We concluded that the proposed variation was likely to facilitate more intense competition, which ultimately would be to the benefit of consumers. The potential for detrimental impacts on competition from making the licence variation was limited. We did not foresee a situation where existing market players would be prevented from competing with Freedom4 and where the entry of a new service provider could lead to weaker competition and diminished consumer benefits. On the contrary, we considered that making the licence variation would assist the promotion of competition.
- 3.37 In their responses to the UK Broadband consultation the two respondents argued that competition would be distorted if the variation were made. We examined their arguments in some detail, looking at the relevant markets, cost differences and the impact on investment. On the basis of our further analysis we considered that granting the licence variation request had the potential of benefiting consumers and could enhance the dynamic process for the provision of these services.

Conclusion

- 3.38 We set out in the consultation our analysis of competition scenarios in the event of granting the requested variation to the Freedom4 licence. We have no reason to change our conclusion that granting the variation would have the potential of strengthening competition to the benefit of consumers.

Fee level for the licensed spectrum

- 3.39 In the consultation we pointed out that Freedom4's current level of fees under Administered Incentive Pricing was based on calculations made several years ago and which have not been reviewed recently. The market for spectrum, the sharers in the relevant bands and the available technologies have all changed significantly.
- 3.40 In their responses to the UK Broadband consultation the two respondents suggested that if its licence were varied UK Broadband should pay an additional fee to reflect the higher value of mobile spectrum.
- 3.41 BT made a similar point in its response to the present consultation. It said that the fee levels should be carefully reviewed when spectrum is liberalised.
- 3.42 We will shortly consult on a Strategic Review of Spectrum Pricing⁸ and we consider that Freedom4's fee should be reviewed within any new framework that might arise from that review. We would then consult on the appropriate fee level. It is reasonable in the meantime to continue charging for Freedom4's use of spectrum at the current level.

⁸ See <http://www.ofcom.org.uk/radiocomms/ifi/srsp/>

Conclusion

- 3.43 We do not consider that any of the points raised in responses undermines the position on the Freedom4 licence fee that we took in the consultation.

Discrimination against mobile network operators

- 3.44 In the consultation we set out our view that because the circumstances of Freedom4 and the 2G and 3G licensees were different in a number of important ways there was no undue discrimination in the existence of different licence conditions between them.
- 3.45 In their responses to the UK Broadband consultation the two respondents argued that UK Broadband would be in similar circumstances to themselves but would be treated more favourably. Favourable treatment would include more liberal licence conditions, lack of roll out obligations, higher power and lower spectrum costs. Therefore, varying UK Broadband's licence as proposed would have been discriminatory.
- 3.46 Both respondents argue that we should postpone any decision on Freedom4's request until other major spectrum management decisions have been made, in particular on mobile liberalisation and our Strategic Review of Spectrum Pricing. They argue that it would be discriminatory to vary the Freedom4 licence now, particularly without any further obligations and fees.
- 3.47 We set out in paragraph 6.28 of the consultation our consideration of the different circumstances of Freedom4 and the mobile network operators. The main differences we identified were:
- 2G and 3G licensees have developed extensive networks whereas, in contrast, if Freedom4 is allowed to provide mobile services it will need to build a network from what is at present a very limited geographical and customer base.
 - The MNOs operate in recognised prime mobile frequency bands whereas the 3.6 GHz band was until recent years seen primarily as one suitable only for fixed services. Equipment being developed for the band has had to be designed to overcome the unfavourable propagation characteristics of the band for mobile communications relative to those of the established mobile cellular bands.
 - Freedom4 currently provides different services from 2G and 3G operators and may continue to do so even if the licence variation is made.
- 3.48 We considered that there are sufficient differences in the circumstances of Freedom4 and the 2G and 3G operators to justify the existence of different licence conditions. We also noted that we are currently considering responses to our recent consultation on liberalising and making tradable the 2G and 3G licences.

Conclusion

- 3.49 We consider that, taking account of the various aspects of the question of discriminatory treatment between operators who are in similar circumstances, varying the Freedom4 licence in the way proposed would not amount to undue discrimination.

Timing of the licence variation

- 3.50 We said in the consultation that given the intention of Freedom4 to provide innovative services that rely on mobile WiMAX, delaying the licence variation could prevent most of the incremental beneficial impacts to consumers from the licence variation. Such a delay would be likely to result in the reduced provision of mobile broadband services in the UK over the next two to three years. This could in turn lead to further delays and lower take-up of similar deployments that rely on different spectrum frequencies and could be launched from 2010/2011 (including similar uses relying on 2.6 GHz spectrum).
- 3.51 Both respondents argue that we should postpone any decision on Freedom4's request until other major spectrum management decisions have been made, in particular on mobile liberalisation and our Strategic Review of Spectrum Pricing.
- 3.52 On 13 August 2009 the Government published an implementation plan for delivering the actions on, among other things, mobile liberalisation arising from Digital Britain⁹. We consider that the issues raised by mobile liberalisation are more complex than those raised by the Freedom4 variation and are likely to be decided on a longer timescale, possibly following a Government direction to Ofcom in due course. We consider that the opportunity to deliver the consumer benefits that could follow from the Freedom4 variation should be given without delay. An early decision on the proposed variation would also reduce regulatory uncertainty.

Conclusion

- 3.53 We consider that the proposed variation should not be delayed and should take place as soon as practicable in order to maximise the potential benefits for consumers and competition.

Administrative consistency, rationality and procedural fairness

- 3.54 In its response to the UK Broadband consultation T-Mobile argued that we should be aware of the need to comply with the principles of administrative law, i.e. administrative consistency, the duty to act rationally and procedural fairness. In the UK Broadband statement we said that the issue of what is termed as administrative consistency is the much the same issue as that considered under the discrimination heading. As we have set out in this document under that heading, we consider that a licence variation would not be discriminatory. This consultation exercise has been held, inter alia, to ensure procedural fairness.

Conclusion

- 3.55 We consider that in examining Freedom4's request for the variation of its licence we have complied with the principles of administrative law.

Objective justification for licence conditions

- 3.56 We stated in the consultation that the mobile broadband market is developing and indicated that the continuation of the restriction on mobile use in Freedom4's licence was no longer justified.

⁹ [Digital Britain Implementation Plan - August 2009](#)

- 3.57 We consider that we have a legal duty, contained in section 9(7) of the Wireless Telegraphy Act 2006, not to preserve wireless telegraphy licence conditions which cease to be objectively justifiable or proportionate, unless there are compelling reasons to do so, such as unfairness to others. We have examined in the current document the various points raised in responses to the consultation that relate to matters, including the impact on competition, discrimination and interference to other radio users, that might provide compelling reasons not to vary the Freedom4 licence as proposed.

Conclusion

- 3.58 We consider that the continuation of the restriction on mobile use in the Freedom4 licence is not justified and our examination of consultation responses suggests that there are no compelling reasons not to vary the licence as proposed.

International obligations

- 3.59 We must comply with UK obligations under European law or international agreements where use of spectrum has been harmonised. We will not agree to remove restrictions from licences or other changes that would conflict with the UK's obligations under international law. At the time of the consultation there was no such obligation relating to the 3.6 GHz band.
- 3.60 The Decision has set parameters for the harmonisation of BWA in the band 3.4 to 3.8 GHz. We consider that to grant the variation would be consistent with the Decision.
- 3.61 Some respondents noted that the technical conditions in the Decision extend only up to 3.8 GHz and suggested that therefore mobile use should not be permitted in 3.8 to 4.2 GHz. We do not consider that the Decision, or any other regulatory instrument, prevents mobile use in this higher band.

Conclusion

- 3.62 The variation of the Freedom4 licence as proposed would not breach our obligations under international law. The proposed variation is consistent with the harmonisation of the band 3.4 to 3.8 GHz for BWA services.

Variation of other Broadband Wireless Access licences

- 3.63 In its response UK Broadband argued that all licensees in the 3.4 to 3.8 GHz band should be considered to be in the same class and should have similar licence conditions. Where different licence conditions imposed a cost differential on some licensees within a class this would distort the market and could impeded the roll-out of services.
- 3.64 We do not consider that UK Broadband's licence and the Freedom4 licence are in the same licence class, because of the different sharing arrangements imposed on the two operators. Freedom4 shares its licensed spectrum with satellite earth stations and fixed links whereas UK Broadband does not share with other users. There is a requirement on Freedom4 to coordinate with these other users. This is a significant restriction and represents a material difference from how UK Broadband is able to operate. In any case we consider that if UK Broadband wishes to have similar licence conditions it may submit a variation

request. It said in its response that it would shortly be applying for a variation. We will consider any such request against our statutory duties.

Points for clarification

3.65 BT commented on the accuracy of some statements in the consultation. Its points and our responses to each are as follows:

- The last sentence in paragraph 3.8 was incorrect - in the band above 3600 MHz IR 2015 permits a maximum eirp of 14 dBW/MHz with 3 dBW/MHz being the normal level.

Our response - All BWA clearances to date in the UK have been on a “case by case basis” therefore a maximum eirp of 14 dBW/MHz is permitted.

- In paragraph 5.5 it was not clear how the change of licence could permit Freedom4 to provide connections to “anywhere in the UK” as there must be areas where a BWA operator cannot deploy without causing unacceptable interference into earth stations and point-to-point fixed links.

Our response - This is not a change to the licence, coordination needs to be undertaken before deployment but an application for coordination can be made anywhere in the UK.

- UK Broadband is not assigned spectrum in the frequency range 3500 to 3580 MHz as paragraph 5.7 states.

Our response - Agreed. UK Broadband is assigned spectrum in the frequency range 3480 to 3500 and 3580 to 3600 MHz.

Section 4

Decisions and next steps

4.1 This section sets out our decision on Freedom4's request to vary its licence to increase the permitted power limits and remove the restriction on mobility for terminal stations.

4.2 We have broad discretion to vary licences, subject to acting in accordance with our statutory duties and general legal principles. The duties relevant to this decision are to:

- further the interests of citizens and consumers;
- secure optimal use of the spectrum;
- have regard to the desirability of promoting:
 - efficient management and use of spectrum
 - economic and other benefits arising from the use of wireless telegraphy
 - development of innovative services
 - competition in provision of electronic communications services;
- ensure licence conditions are objectively justified, non-discriminatory, proportionate and transparent.

General legal principles include duties to act reasonably and rationally when making decisions and to take account of legitimate expectations.

4.3 We set out our analysis of Freedom4's variation request in the consultation. Our view that the variation should be made as soon as practicable was subject to the outcome of the consultation. We have considered all responses, in particular those that objected to or expressed reservations about the variation proposed. Our assessment of the responses is summarised in the previous section. We have also taken into account the Decision on the harmonisation of spectrum in the 3.4 to 3.8GHz band for electronic communications services, including mobile and nomadic as well as fixed use, and the fact that the proposed variation would be consistent with it.

4.4 We have a duty not to preserve wireless telegraphy licence conditions that are no longer objectively justifiable or proportionate, unless there are compelling reasons to maintain them. We have therefore decided to vary Freedom4's licence as proposed in the consultation. As soon as practicable we will issue a revised licence to Freedom4.

Annex 1

List of responses received

BT

BBC

Cable and Wireless

European Satellite Operators Association

Global VSAT Forum

Inmarsat

Intelsat

O2

Samsung

SAP REG

Schlumberger Oilfield UK Ltd

SES

T-Mobile

UK Broadband

(These are available at: <http://www.ofcom.org.uk/consult/condocs/freedom4/responses/>)

Plus 1 confidential response and 1 confidential annex

Annex 2

Summary of responses to the consultation

Subject	Comment	Respondent	Response
Receiver Blocking	Respondents believed that it was likely that receiver blocking would occur on adjacent channels and that coordination should be undertaken to avoid this, regardless of the frequency at which the earth station is currently operating	BT, BBC, Intelsat, SOUK	Coordination arrangements are discussed in paragraph 3.8.
Block Edge Mask	By allowing Freedom4 a relaxed set of limits (from those in provisions of the Decision) until 2012, it removes any commercial incentive for Freedom4 to agree mitigation measures with UKB. Freedom4 already has lower limits, and therefore it does not need to negotiate and agree these with UKB.	UKB	This is unchanged from the current situation. As discussed at paragraph 3.12 UKB may apply for a variation if they wish to relax their limits. The Decision limits are being applied from 2012, this is a considerable constraint compared to F4's current mask.
	The difference would provide Freedom4 with an unfair commercial advantage over other licence holders (including UK Broadband) and thereby distort the market.	UKB	See paragraph 3.12.
	Changes made to the Freedom4 licence should be applied to the whole licence class.	UKB	See paragraph 3.12.
Coordination	25 dBm/MHz for mobile terminals is higher than used in ITU studies for WRC-07.	Intelsat	The Aegis and Ofcom studies have been carried out since WRC-07 and used higher mobile powers 20 and 30dBm/MHz respectively.
	Concern was raised that there could be a situation where the mobile terminal operated to a base station that was shielded from the earth station by terrain but the terminal was line of sight.	C&W	Ofcom is not aware of any earth station site in the UK where a request for clearance of a BWA Central Station, at the power levels requested in the variation, would result in a "no coordination needed" under the OfW188 procedure and yet a mobile terminal would be line of site to both the BWA Central Station and an earth station operating in the band 3600 – 4200 MHz.
	Concern was raised that the relaxation of the licence to allow mobile services means, in effect, the uncontrolled and uncoordinated use of C band and offers the existing user no means	BBC	The Aegis and Ofcom ITU studies quoted in the application demonstrate that coordination of the BWA Base station ensures coordination of mobile

	of seeking relief from interfering users.		terminals. It should be noted that these mobile terminals can only transmit when within base station coverage.
	Where local clutter is to be used as mitigation to reduce interference it would be necessary for measurements to be carried out to ensure that the agreed protection criteria will be met, before deployment of a central station.	Intelsat	This would be part of detailed coordination to be agreed by the parties involved. Ofcom is aware that such surveys have already been undertaken at some earth station sites.
	ECC DEC(07)02 makes clear the need to coordinate with and to protect the continued deployment of FSS in this band.	SES	ECC/DEC(07)02 does not offer protection of the continued deployment of FSS. In the UK and many other CEPT administrations, assignments in the band are made on a first come, first served basis.
	The variation would impact existing operations and investments.	SOUK	Ofcom believes that the existing operations referred to are licensed FSS earth stations and as such there will be a continuing requirement that they are protected.
	Respondents (3) requested that stakeholders be involved in reviewing the coordination procedure	Inmarsat, SOUK, BT	The process will be reviewed to include the extra requirements outlined within the consultation and Ofw188 updated. There will be no relaxation of the coordination requirements. All detailed coordination is undertaken between the affected parties.
	Earth stations are subject to change of satellite which is not in their concern and therefore assignment data will be subject to change over time.	BT	Noted and agreed, it is expected that in the coordination agreement between the BWA operator and the earth station operator will have to include an operational agreement.
	Details of the coordination procedure are not clear	C&W	Ofcom performs an initial technical assessment of the BWA application to determine whether detailed coordination is required. BWA and Earth Station operators are notified when detailed coordination is required. Ofcom will revise and publish its initial coordination process in the coordination document Ofw188.
	It is highly recommended that reference should be made to existing ITU-R recommendations and reports. In particular,	SES	These recommendations have been taken into consideration when formulating the procedures in

	recommended interference criteria are given in Recommendations ITU-R S.1432 and SF.1006.		Ofw188.
	Coordination issues could be mitigated by limiting mobile operation to below 3625 MHz where there is little satellite earth station operation in the UK.	Intelsat	Ofcom believes that the coordination of base stations will provide the required protection to earth stations.
	All base stations must be co-ordinated whether permanent or temporary.	C&W	Agreed, this is the current coordination requirement.
	Base stations should not be allowed to operate from a mobile platform.	C&W	All base stations must be co-ordinated prior to deployment.
	The increased power of base stations and operation of mobiles changes the coordination requirements.	C&W	The Aegis and Ofcom studies both showed that if a base station is co-ordinated it is the dominant interferer. There is no change in the coordination requirements except the need to consider a higher power; the coordination threshold at the earth station will remain unchanged.
	How will Ofcom ensure that the shared use of the band will be managed in a way that enables new fixed point-to-point link and earth station proposals to be accommodated in future? Will Ofcom ensure that geographical areas are not blocked out by speculative requests to register BWA base stations or Earth stations?	BT	This possibility exists under current licensing arrangements, with no evidence of the concern arising. If a situation arose where we received evidence that sites had been registered but not developed within a reasonable period of time, and that such registrations were obstructing efficient use of spectrum, we would consider whether additional steps should be taken to promote efficient use of spectrum.
International Coordination	Respondents (5) called for a requirement to protect non-UK FSS earth stations to be included in the Freedom4 Licence.	SES, GVF, SAP-REG, Inmarsat, Intelsat	For international coordination purposes, the BWA Central Station can be treated in a similar manner to a station in the fixed service. As such, Ofcom will fulfil its international obligations as necessary and protect notified earth stations as required by 9.17 and 9.18.
	One respondent requested that the requirements of ITU Radio Regulation No. 5.430A, for the protection of FSS earth stations in neighbouring countries in the band 3.4-3.6 GHz, including the	Intelsat	ITU Radio Regulation No. 5.430A is not applicable to this band and relates to IMT. We would be happy to discuss the application of these limits within a

	<p>pdf limit at the national border, be incorporated into the Freedom4 licence for the bands 3605-3689 MHz and 3925-4009 MHz.</p>		<p>Memorandum of Understanding should neighbouring administrations request this. We have similar MoUs in other bands, the requirement to co-ordinate under these memoranda is covered by the general coordination clause in the licence.</p>
Coordination clause in the Licence	<p>Respondents (3) were unhappy with the removal of text regarding coordination from the licence schedule.</p>	GVF, SAP-REG, Intelsat	<p>There is no change in the requirement to co-ordinate. The licence requires compliance with the coordination procedure in Ofw188, which is the appropriate place for the text relating to coordination issues. Ofcom will revise and publish this coordination process in the guidance sheet Ofw188.</p>
	<p>One respondent commented that the coordination procedure should be included within the licence.</p>	Inmarsat	<p>The detailed coordination is undertaken by the BWA and FSS operator. Ofcom undertakes an initial technical evaluation. This process is set out in Ofw188 and the licence requires that this process is followed.</p>
IR2015	<p>The variation allows between 9 and 20 dB additional e.i.r.p. from base stations than is allowed at present in accordance with IR2015.</p>	BT	<p>IR 2015 is currently under review and will be updated to incorporate changes due to the licence variation.</p>
European and International Regulations	<p>In the Radio Regulations, the European Common Allocation table and the UK Frequency Allocation Table mobile services have a secondary allocation between 3800 and 4200 MHz, fixed services and fixed satellite services have a primary allocation.</p>	SES, ESOA, Intelsat, SOUK, GVF, SAP-REG	<p>In the UK, this band has always been shared between FSS and FS on a first come first served basis. Freedom4's present licence covers both the 3605- 3689 MHz and the 3925 – 4009 MHz bands on a national basis, with a condition that existing services, earth stations and fixed links, are protected or coordinated.</p>
	<p>There is ample alternative spectrum available for such applications.</p>	ESOA	<p>Freedom4 already has a licence at these frequencies and Ofcom is required to consider any request made by the licensee for a variation to the existing licence.</p>
Future FSS use	<p>Respondents (4) felt that the variation would constrain future use of the band for FSS.</p>	GVF, SAP-REG, Intelsat, SES	<p>This band has always been shared in the UK between the FS and the FSS on a "first come first served" coordinated basis. This will continue to be the situation after the licence variation.</p>

Mobile FDD operation	Respondents (5) were concerned about unco-ordinated mobile terminals if a FDD system was deployed.	GVF, SAP-REG, Inmarsat, Intelsat, ESOA	Ofcom agrees that FDD operation of terminals needs to be considered in the coordination requirement. The text in Ofw188 will be updated to include 'Where a mobile terminal is operating to a co-ordinated base station, on the same frequency, no further coordination is required for the mobile terminal '.
Power increase	The increased in power is not compatible with co-existence with earth stations and would lead to larger coordination distances	Intelsat	Ofcom accepts that this will lead to a greater requirement for coordination.
Standards based terminal	UK Broadband considers that restrictions on spectrum mask in UK spectrum licences should be replaced by the standards that have been agreed to by international standard bodies such as ETSI and on which the major equipment manufacturers are basing their latest range of devices.	UK Broadband	The terminal mask in the Freedom4 variation is based on the ETSI standard EN 302 623 taking into account the recommended guardband in ECC DEC(07)02. In recent years policy has been to be technology neutral hence the specification of a mobile terminal block edge mask in the variation proposal.
Clarifications	The last sentence is an incorrect statement. In <u>the band above 3600 MHz</u> , IR2015 permits a maximum eirp of 14 dBW/MHz with 3 dBW/MHz being the normal level (IR2015: " <i>The carrier power shall be less than +3 dBW/MHz, however powers up to but not exceeding +14 dBW/MHz will be considered on a case-by-case basis. See the relevant co-existence guidelines for details.</i> ")	BT	All BWA clearances to date in the UK have been on a "case by case basis" therefore a maximum EIRP of 14dBW/MHz is permitted.
	It is not clear how the change of licence can permit Freedom4 to provide connections to "anywhere in the UK" as there must be areas where a BWA operator cannot deploy without causing unacceptable interference into earth stations and point-to-point fixed links.	BT	This is not a change to the licence; coordination needs to be undertaken before deployment but an application for coordination can be made anywhere in the UK.
	UK Broadband is not assigned spectrum in the frequency range 3500-3580 MHz as this paragraph states.	BT	Agreed UK Broadband is assigned spectrum in the frequency range 3480 to 3500 and 3580 to 3600 MHz.
Comparison with the variation of UK Broadband's 3.5 GHz	Freedom4 variation raises very similar issues to the variation made to UK Broadband's 3.5 GHz licence and objections to that variation also applied to Freedom4's.	T-Mobile	We consulted on variation made to UK Broadband's 3.5 GHz licence in June 2007 and issued a statement in November 2007 setting out our decision to grant UK

licence			Broadband's variation request. The respondents to the current consultation attached their responses to the earlier one. We considered in detail in our statement on UK Broadband's variation all points raised in responses to the consultation. We summarise the material in section 3 of this document (paragraphs 3.12 to 3.41).
Increased value of the licensed spectrum	The fee levels should be carefully reviewed when spectrum is liberalised.	BT	Fee levels are discussed at paragraphs 3.40 to 3.43.
Discrimination against mobile network operators	It would be discriminatory to vary Freedom4's licence now, particularly without any further obligations and fees.	T-Mobile	Discrimination issues are discussed at paragraphs 3.45 to 3.49.
Timing of the licence variation	We should postpone any decision on Freedom4's request until other major spectrum management decisions have been made, in particular on mobile liberalisation and our Strategic Review of Spectrum Pricing	T-Mobile	Timing of the variation is discussed at paragraphs 3.52 and 3.53.
International obligations	The technical conditions in the Decision extend only up to 3.8 GHz and suggested that therefore mobile use should not be permitted in 3.8 to 4.2 GHz. We do not consider that the Decision, or any other regulatory instrument, prevents mobile use in this higher band.	C&W, Schlumberger, SES, Intelsat, BBC	The variation of Freedom4's licence as proposed would not breach our obligations under international law. The proposed variation is consistent with the harmonisation of the band 3.4 to 3.8GHz for BWA services.