



Additional Spectrum for Transportable Earth Stations

Consultation

Publication date: 13 September 2010

Closing Date for Responses: 11 October 2010

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Section 1

Executive Summary

- 1.1 This consultation sets out proposals to make additional spectrum available for Transportable Earth Station (TES) satellite uplinks in order to meet demand from stakeholders and to relieve excessive demand on satellite capacity in the currently licensed frequency band 13.78 – 14.5 GHz (referred to in this consultation as “Ku band”). Transportable Earth Stations are typically used by Satellite News Gathering (SNG) organisations to provide live and breaking news stories via satellite for onward broadcast.
- 1.2 The additional frequency bands that we propose to make available for licensed TES transmitters are 5.925 – 7.075 GHz (referred to in this consultation as “C band”) and 27.5 – 27.8185 GHz, 28.4545 – 28.8265 GHz and 29.4625 – 30 GHz (collectively referred to as “Ka band”). These additional bands are already used by other types of satellite earth stations and so making them available to TESs increases the flexibility for the satellite licence product family. The proposed changes would increase the available spectrum for licensed TES use by about three times.
- 1.3 We see demand for C band use by TES uplinks mainly from foreign SNG operators covering international news stories or sporting events in the UK. We are also seeing an interest from TES operators to make use of the increasingly available satellite capacity at Ka band. Much of this demand for access to additional spectrum bands is a result of increasing congestion in the traditionally used Ku band. By opening up additional spectrum bands for TES use and setting licence fees as described in Section 3, we can promote more efficient use of spectrum by encouraging use of less congested frequency bands.
- 1.4 This consultation seeks views on the principle of making additional frequency bands available for licensed TES use; the specific proposals for licensing and coordination; and our approach for setting licence fees.

Section 2

Introduction

- 2.1 Transportable Earth Stations (TESs) are generally used for temporary and occasional transmission of video, sound and data signals to communication satellites for onward delivery. They are typically used by Satellite News Gathering (SNG) organisations to deliver live and breaking news stories for onward broadcast. Other applications include outside broadcast links for sporting events, mobile library data connectivity and data transfer for emergency response vehicles.
- 2.2 A Transportable Earth Station is comprised of portable satellite communication equipment that is normally installed on a vehicle, such as a van, to facilitate rapid deployment at any location where it may be needed. Increased portability is possible by use of freestanding Flyaway units that can be transported by hand in packing cases. Because many types of TES deployment are planned at very short notice, for example to provide coverage of unplanned fast-breaking news stories, the regulatory framework must allow for the expeditious authorisation of their transmissions.
- 2.3 Ofcom currently licenses TES uplinks to satellites in the 13.78-14.5 GHz frequency band (Ku band). The licence registers the TES equipment and individual requests for transmissions are processed through Ofcom's rapid online clearance and coordination tool called SPECTRAsc. Clearance and coordination of transmissions is required to ensure that, where necessary, use of these frequencies by other users is protected and also to prevent emission hazards to sensitive sites (including those operated by the MoD) and aircraft control systems. TES use is on a non-interference, non-protected (NINP) basis and so does not impact the use of spectrum by other licensed services.
- 2.4 Globally, Ku band is one of the most heavily used satellite uplink bands and has been used for many years by operators of many types of earth station including Transportable Earth Stations. Growing demand for satellite uplinks has led to scarcity of the available Ku band satellite capacity as satellite operators find it increasingly difficult to accommodate additional satellites in an already congested orbit. It is the satellite capacity in space that is constrained, not the availability of spectrum for use within the UK.

Section 3

Proposals

Rationale

- 3.1 Ofcom proposes to make the following frequency bands at C band and Ka band available for licensed use by Transportable Earth Station (TES) uplinks in order to permit satellite operators to satisfy increasing demand which cannot be accommodated within the currently available satellite capacity in the Ku band.

Table 1. Proposed frequency bands for TES

	Band	Frequency Range (GHz)
Already licensed	Ku band	13.78 – 14.5
Proposed	C band	5.925 – 7.075
	Ka band	27.5 – 27.8185
		28.4545 – 28.8265
		29.4625 – 30

- 3.2 We believe that the opening of additional bands for TES operation will provide benefits to the satellite sector by removing capacity constraints and that this should reduce constraints on service provision by comparison with a scenario in which TES use is limited to Ku band alone. In turn, this can be expected to lead to wider availability of news and sporting broadcast content than would otherwise be the case and will benefit citizens in terms of increased availability and choice of programme material. At the same time, we do not expect the use of C band and Ka band by TESs to impact adversely on other services using this spectrum because TESs will operate on a non-interference, non protected basis¹.

C band

- 3.3 We propose to make C band available for licensed TES use for a number of reasons. C band was the first frequency band to be allocated for commercial satellite communications and is used in the UK by several large transmitting permanent earth stations (PES) and fixed terrestrial point-to-point microwave links. The band is not currently licensed to Transportable Earth Stations in the UK because demand has until now been met by use of Ku band. However, C band TES equipment is heavily used in other countries, particularly in tropical regions, because the lower frequencies are less susceptible to signal fade in the presence of heavy rain. We therefore see demand for C band use by TES uplinks from foreign broadcasters wishing to use their own equipment to cover international news stories or sporting events in the UK. The use of C band is also more suited for inter-continental satellite links because satellite beam coverage areas are inherently larger at lower frequencies.

¹ We have considered whether we are required to undertake a full Equality Impact Assessment (EIA) for our proposals in order to identify whether they would have particular effects on specific groups within society. On the basis of our initial EIA screening we have decided that this is not necessary because our proposal to make additional spectrum available for TES use does not raise specific equality issues; there is no reason to believe that the proposals will affect consumers and citizens differentially depending on their age, race, religious beliefs, disability, sexual orientation, gender or, in the case of Northern Ireland, marital status, dependents or political beliefs and opinion.

- 3.4 We anticipate that the demand for C band TES use is likely to be high at the London 2012 Olympics. In our Statement on the London 2012 Olympics Spectrum Plan², we indicated our willingness to consider the use of C band TES terminals.
- 3.5 We are also aware that a number of UK TES operators would benefit from being able to use C band for occasional use. Currently, the only option for authorisation of C band satellite use in the UK is the PES licence, which has long lead times for authorisation and is therefore not suited for TES use, demand for which typically arises at short notice.
- 3.6 Because C band is an established satellite communication band, it is likely to be the next best alternative to the congested Ku band, at least until Ka band satellite availability and user equipment becomes more extensive.
- 3.7 We do not propose to license TES use in the 200 MHz of spectrum from 5.725 to 5.925 GHz. Although this spectrum is allocated to the Fixed-Satellite Service in the Earth-to-space direction and is available for use by PES, a number of other types of radio³ systems operate in these frequencies either on a light-licence or licence-exempt basis. Because the locations of these other radio systems are unknown, coordination with TES deployments would not be possible. The uncoordinated use of TES in this frequency range would not only increase the probability of interference to these other users, but would also create an interference environment that was more unpredictable and difficult to manage.

Ka band

- 3.8 We also propose to license TES equipment in the various Ka band frequencies. Satellite operators are already investing heavily in under-utilised spectrum at Ka band to provide additional capacity to meet the excess demand for satellite communication. The ECC is currently preparing a report on the use of Ka band satellites, which identifies that the current congestion of the satellite orbit in other frequency bands (e.g. Ku band) is forcing satellite operators to add Ka band transponders to their spacecraft to satisfy the growing demand from users. Some satellite capacity is already available to support TES use at Ka band in the UK, but it is likely to be a few years before the Ka band TES equipment becomes more readily available and use becomes more widespread.
- 3.9 In the UK, the Ka band frequency bands are already licensed to a small number of transmitting permanent earth stations and are also authorised for use by high-density Fixed-Satellite Service (HDFSS) uplinks on a licence-exempt basis.
- 3.10 The higher frequencies at Ka band allow for narrower, more focussed satellite spot beams, providing better frequency re-use and thus further increasing the available capacity. The shorter wavelengths at these higher frequencies also allow for smaller earth station equipment and antenna/dish sizes, which better suits operators of Transportable Earth Stations who require high portability. By licensing Ka band TES equipment, we hope to support and encourage the use of less congested frequencies and thus promote more efficient use of satellite uplink spectrum.

Question 1. Do you have any comments on our proposal to make C and Ka band frequencies available for TES licensing?

² <http://stakeholders.ofcom.org.uk/binaries/consultations/london2012/statement/statement.pdf>

³ Other uses of spectrum below 5.925 GHz include short range devices; programme making and special events; intelligent transport systems; and fixed wireless access.

Licensing Arrangements

- 3.11 We propose to introduce licensing and authorisation arrangements for TES use of C band and Ka band, which are broadly similar to those currently in place at Ku band.
- 3.12 Currently, at Ku band, there are three categories of TES licence – categories 1, 2 and 3. For a given user, the appropriate category of TES licence depends on the power and bandwidth transmitted by the TES equipment. Table 2 shows which types of TES equipment are covered under each licence category.

Table 2. TES licence categories

	P×BW = maximum equipment power (in Watts) multiplied by maximum bandwidth (in MHz)
Category 1	$P \times BW \leq 100$
Category 2	$100 < P \times BW \leq 2,500$
Category 3	$2,500 < P \times BW$

- 3.13 A single TES licence can cover multiple transportable earth stations, providing each piece of earth station equipment falls in the same licence category. For example, a Category 1 TES licence can cover, say, eight transportable earth stations providing each of those earth stations has a “P×BW” value less than or equal to 100. If the same licensee has another earth station that falls within Category 2, that earth station will need to be licensed separately under a Category 2 TES licence.
- 3.14 We propose to retain the three TES licence products (Category 1, 2 and 3) that are applicable at Ku band and apply these also to C and Ka bands. This will mean that a single TES licence can cover multiple earth stations irrespective of whether they operate in C band, Ku band or Ka band, but providing they are of the same category. However, each piece of equipment will need to be designated for operation in C, Ku or Ka band in order to determine the appropriate licence fee, as described later in this section.

Clearance and authorisation to transmit

- 3.15 Once the TES licence is granted, the licensee is required to apply for individual uplink authorisations using Ofcom’s online clearance and coordination tool called SPECTRAsc. We propose to extend the functionality of SPECTRAsc to allow clearances of C and Ka band TES equipment.
- 3.16 The process for obtaining C and Ka band authorisations using SPECTRAsc will broadly be similar to that currently applied in Ku band. However, the specific types of clearance and coordination processes will depend on the frequency band because each band is subject to different sharing arrangements. A summary of the proposed clearance and coordination arrangements for C and Ka band is shown in Table 3. The existing processes applied at Ku band are also shown in the table for comparison. The term “emc clearance” (where emc stands for electromagnetic compatibility) refers to the process to check that emissions from a proposed TES transmitter do not interfere with sensitive electronic equipment such as aircraft flight control systems in the vicinity of airports. The term “coordination” refers to the process that checks that emissions from the proposed TES transmitter will not interfere with other users of the frequency band, such as terrestrial fixed microwave links and radiolocation stations.

Table 3. TES clearance and coordination arrangements by frequency band

	TES Clearance / Coordination arrangements
Ku band	<ul style="list-style-type: none"> • emc clearance with Mod and CAA • coordination with fixed microwave links in the band 14.25 – 14.5 GHz • coordination with radiolocation stations in the band 13.75-14.0 GHz
C band	<ul style="list-style-type: none"> • emc clearance with Mod and CAA • coordination with fixed microwave links in the band 5.925 – 7.125 GHz
Ka band	<ul style="list-style-type: none"> • emc clearance with Mod and CAA

- 3.17 Unlike Ku band, which is closed to new fixed microwave link licence applications, Ofcom still actively licenses and assigns terrestrial fixed microwave links in C band. For this reason, we intend that the SPECTRAsc fixed microwave link database is refreshed automatically on a daily basis to ensure that TES clearance/coordination requests are considered against the most up to date information.
- 3.18 However, we note that even with the most up to date fixed microwave link information, it is still possible for a successfully coordinated TES transmitter to cause interference to a fixed microwave link that may be assigned and brought into operation some time after the TES authorisation was made on SPECTRAsc. For that reason, we have considered the typical minimum timeframe for bringing a fixed microwave link into operation after it has been assigned and licensed by Ofcom. We expect this minimum timeframe to be about one month and so to minimise the possibility of interference from a TES transmitter into a fixed link receiver, we propose that the expiry date of a TES authorisation in C band is no more than one calendar month following the date that the TES clearance request was made.
- 3.19 As is the case in Ku band, we propose that authorisations for TES uplinks in C and Ka band are on a non-interference, non-protected (NINP) basis, which means that they shall not cause interference to, nor claim protection from other licensed radio systems in the band. On that basis, we propose that TES use of C band will be coordinated with fixed link use but not vice-versa. This means that applications for fixed links will not be coordinated with TES use and therefore TES use of C band will not constrain the ongoing licensing and deployment of fixed links.
- 3.20 As part of the authorisation process on SPECTRAsc, TES licensees currently select the satellite to which the TES uplink is to be made from a pre-defined list of satellite names and associated orbital locations. Having a list presents Ofcom with the task of having to maintain the list as new satellites are brought into operation or existing satellites are modified or removed. In making additional spectrum available for TES uplinks in C and Ka band, the number of satellites increases and the task of keeping the list up-to-date becomes more problematic. We propose to retain the list of satellites on SPECTRAsc but to provide an alternative option to allow the TES licensee to manually define the satellite name and orbital location.

Question 2. Do you have any comments on the proposed arrangements for licensing, clearance and authorisation of TES?

Licence Fees

- 3.21 On extending the TES licensing regime from Ku band into the C and Ka bands we propose to apply exactly the same principles and approach for fees charging as are

used for TES use in the Ku band. The reasons for adopting this approach, as opposed to carrying out a “from first principles” fee review for the C and Ka bands themselves are as follows:

- It would distort the choice of frequency band an operator makes if the fees for use of C and Ka bands were to be based on different principles to those used for Ku band.
- It would only make sense to develop new “from first principles” fee proposals for TES at C band and Ka band as part of a wider review of fees for TES and licence classes sharing the use of these bands, including fixed links and Permanent Earth stations. However, we are currently consulting on a revised framework for spectrum pricing⁴ and it would not make sense to undertake such a wide ranging fee review in isolation from the new framework. Accordingly, were we to wait until we were in a position to carry out such a review, we would have to delay significantly the date at which we could extend the TES licensing regime to C and Ka bands. This would delay the provision of additional benefits to citizens that we anticipate will arise from this change.

3.22 The fee for TES equipment using Ku band is derived from the fee algorithm for a Ku band Permanent Earth Station (PES) licence. The PES licence fee algorithm, including the band factors in Table 4, is shown below.

$$AS = \sum_{bands} \left[28 \times BF_{band} \times \sqrt{\sum_{paths_{band}} (P_{path} \times BW_{path})} \right]$$

where -

“AS” means the appropriate annual sum in pounds sterling;

“bands” mean the numbers listed in Column 1 of Table 1, corresponding to the range of frequency band listed in Column 2 of that table which are authorised by the licence;

“ BF_{band} ” means the band factor applying to each band, being the number in Column 3 of Table 1 corresponding to the band listed in Column 1 of the same table;

“ $paths_{band}$ ” means the set of those transmission paths authorised by the licence for which the authorised transmission frequency lies within the frequency range of each band as set out in Column 2 of Table 1;

“ P_{path} ” means the authorised peak transmit power (in Watts) at the flange of the antenna of the earth station for each transmission path;

“ BW_{path} ” means the authorised transmit bandwidth (in MHz) for each transmission path; and

“transmission path” means a combination of a satellite earth station transmitter, a satellite receiver, a transmission frequency and polarisation for which transmissions are authorised by the licence.

⁴ <http://www.ofcom.org.uk/consult/condocs/srsp/>

Table 4. Licence fee Band Factors for Permanent Earth Station

Column 1: band	Column 2: Range of frequency band (<i>fb</i>) (in GHz)	Column 3: Band factor
1	$fb < 5$	2.33
2	$5 \leq fb < 10$	1.72
3	$10 \leq fb < 16$	1.00
4	$16 \leq fb < 24$	0.70
5	$fb \geq 24$	0.60

3.23 This leads to the fees for Categories 1, 2 and 3 TES licences applicable at Ku band shown in Table 5.

Table 5. Existing Ku band TES licence fees

	P×BW = maximum equipment power (in Watts) multiplied by maximum bandwidth (in MHz)	Annual licence fee per earth station
Category 1	$P \times BW \leq 100$	£ 300
Category 2	$100 < P \times BW \leq 2,500$	£ 1,400
Category 3	$2,500 < P \times BW$	£ 4,300

3.24 Note that the fee shown for each TES licence Category in Table 5 is for each earth station (equipment) registered on the licence. So, for example, the annual licence fee for a Category 1 TES licence with three registered Ku band earth stations is $3 \times £300$, which is £900.

3.25 To derive the fee for each transportable earth station in C and Ka band, we substitute the appropriate values of BF (band factor), P (power) and BW (bandwidth) into the PES fee algorithm. BF is obtained from Table 4 according the frequency range that the TES equipment operates in. The product of P and BW ($P \times BW$) is obtained from Table 2, based on the permitted maximum power and bandwidth for each Category of TES equipment. For Category 1 and 2 TES equipment, the value used for $P \times BW$ is 100 and 2,500 respectively, corresponding to the maximum value for each of those categories. For Category 3 TES equipment, the value used for $P \times BW$ is 23,400, which represents a likely maximum power of 650 Watts supplied to the input of the antenna and a maximum modulated bandwidth of 36 MHz. These are the same figures used to derive the TES licence fees at Ku band.

3.26 Using these criteria, we can derive the appropriate licence fee per earth station applicable in each TES licence category and frequency band. The proposed annual licence fees for TES equipment in C and Ka band are therefore shown below in Table 6. Existing fees for Ku band TES equipment are also shown for completeness.

Table 6. Proposed TES licence fees for C and Ka band

	C band	Ku band	Ka band
	Annual licence fee per earth station	Annual licence fee per earth station	Annual licence fee per earth station
Category 1	£ 500	£ 300	£ 200
Category 2	£ 2,400	£ 1,400	£ 800
Category 3	£ 7,400	£ 4,300	£ 2,600

- 3.27 As is currently the case at Ku band, we propose to allow TES licences to be issued on a short-term basis as well as annually. The fee for a short term TES licence will be pro-rated at 1/12th of the annual fee for each calendar month of operation.
- 3.28 A more detailed explanation of the derivation of these proposed licence fees is shown in Annex 5 and some example licence fees are shown in Annex 6.
- 3.29 As noted above, we are currently consulting on a revised framework for spectrum pricing⁵ and this may lead to a review of existing PES and TES fees (and fixed link fees) in due course. If so, it is possible that, following such a review, the fee rates for TES use in C and Ka bands (as well as Ku band) could change from the levels set out above.
- 3.30 We have considered whether it would be appropriate to set a minimum period before the fees for these new TES licences are reviewed, as we have proposed should be our approach in principle in the spectrum pricing consultation. However, we propose not to do so because the proposed fees have not been based on a free-standing estimate of the opportunity cost of the spectrum denied to others. Instead, for the pragmatic reasons described above, we are proposing to set fees for TES use in C and Ka bands in a way which is consistent with the fees for TES use in Ku band. We therefore believe that it will be appropriate for these fees to be reviewed as and when the comparator fees on which they are based are reviewed.

Question 3. Do you have any comments on the proposed fees for Transportable Earth Station licences in C and Ka band?

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

Section 4

Provisional Timetable and Next Steps

4.1 Depending on the substance of the responses to this consultation and our consideration of them, we expect to be in a position to publish a statement in the last quarter of 2010.

4.2 If we decide to proceed, we will then need to:

- modify the Wireless Telegraphy (Licence Charges) Regulations. Updates to those regulations are normally done on a periodic basis depending on the number of other changes that need to be made. The next update is scheduled for the last quarter of 2010.
- make the necessary changes to our spectrum management system (SMS) to facilitate licensing and coordination of TES.

4.3 The following is an indicative timetable:

Activity	Date
Deadline for receipt of responses to this consultation	11 October 2010
Publication of statement	Q4 2010
Consultation on draft licence charges regulations	Q4 2010
Implementation of TES licensing in new bands	Q2 2011

Annex 1

Responding to this consultation

How to respond

- A1.1 Ofcom invites written views and comments on the issues raised in this document, to be made **by 5pm on 11 October 2010**.
- A1.2 Ofcom strongly prefers to receive responses using the online web form at <http://www.ofcom.org.uk/consult/condocs/tes-additional-spectrum/howtorespond/form>, as this helps us to process the responses quickly and efficiently. We would also be grateful if you could assist us by completing a response cover sheet (see Annex 3), to indicate whether or not there are confidentiality issues. This response coversheet is incorporated into the online web form questionnaire.
- A1.3 For larger consultation responses - particularly those with supporting charts, tables or other data - please email james.richardson@ofcom.org.uk attaching your response in Microsoft Word format, together with a consultation response coversheet.
- A1.4 Responses may alternatively be posted or faxed to the address below, marked with the title of the consultation.
- James Richardson
Floor 3
Spectrum Policy Group
Riverside House
2A Southwark Bridge Road
London SE1 9HA
- Fax: 020 7981 3208
- A1.5 Note that we do not need a hard copy in addition to an electronic version. Ofcom will acknowledge receipt of responses if they are submitted using the online web form but not otherwise.
- A1.6 It would be helpful if your response could include direct answers to the questions asked in this document, which are listed together in Annex 4. It would also help if you can explain why you hold your views and how Ofcom's proposals would impact on you.

Further information

- A1.7 If you want to discuss the issues and questions raised in this consultation, or need advice on the appropriate form of response, please contact James Richardson on 020 7981 3154.

Confidentiality

- A1.8 We believe it is important for everyone interested in an issue to see the views expressed by consultation respondents. We will therefore usually publish all responses on our website, www.ofcom.org.uk, ideally on receipt. If you think your

response should be kept confidential, can you please specify what part or whether all of your response should be kept confidential, and specify why. Please also place such parts in a separate annex.

- A1.9 If someone asks us to keep part or all of a response confidential, we will treat this request seriously and will try to respect this. But sometimes we will need to publish all responses, including those that are marked as confidential, in order to meet legal obligations.
- A1.10 Please also note that copyright and all other intellectual property in responses will be assumed to be licensed to Ofcom to use. Ofcom's approach on intellectual property rights is explained further on its website at <http://www.ofcom.org.uk/about/accoun/disclaimer/>

Next steps

- A1.11 Following the end of the consultation period, Ofcom intends to publish a statement in the last quarter of 2010.
- A1.12 Please note that you can register to receive free mail Updates alerting you to the publications of relevant Ofcom documents. For more details please see: http://www.ofcom.org.uk/static/subscribe/select_list.htm

Ofcom's consultation processes

- A1.13 Ofcom seeks to ensure that responding to a consultation is easy as possible. For more information please see our consultation principles in Annex 2.
- A1.14 If you have any comments or suggestions on how Ofcom conducts its consultations, please call our consultation helpdesk on 020 7981 3003 or e-mail us at consult@ofcom.org.uk . We would particularly welcome thoughts on how Ofcom could more effectively seek the views of those groups or individuals, such as small businesses or particular types of residential consumers, who are less likely to give their opinions through a formal consultation.
- A1.15 If you would like to discuss these issues or Ofcom's consultation processes more generally you can alternatively contact Vicki Nash, Director Scotland, who is Ofcom's consultation champion:

Vicki Nash
Ofcom
Sutherland House
149 St. Vincent Street
Glasgow G2 5NW

Tel: 0141 229 7401
Fax: 0141 229 7433

Email vicki.nash@ofcom.org.uk

Annex 2

Ofcom's consultation principles

A2.1 Ofcom has published the following seven principles that it will follow for each public written consultation:

Before the consultation

A2.2 Where possible, we will hold informal talks with people and organisations before announcing a big consultation to find out whether we are thinking in the right direction. If we do not have enough time to do this, we will hold an open meeting to explain our proposals shortly after announcing the consultation.

During the consultation

A2.3 We will be clear about who we are consulting, why, on what questions and for how long.

A2.4 We will make the consultation document as short and simple as possible with a summary of no more than two pages. We will try to make it as easy as possible to give us a written response. If the consultation is complicated, we may provide a shortened Plain English Guide for smaller organisations or individuals who would otherwise not be able to spare the time to share their views.

A2.5 We will consult for up to 10 weeks depending on the potential impact of our proposals.

A2.6 A person within Ofcom will be in charge of making sure we follow our own guidelines and reach out to the largest number of people and organisations interested in the outcome of our decisions. Ofcom's 'Consultation Champion' will also be the main person to contact with views on the way we run our consultations.

A2.7 If we are not able to follow one of these principles, we will explain why.

After the consultation

A2.8 We think it is important for everyone interested in an issue to see the views of others during a consultation. We would usually publish all the responses we have received on our website. In our statement, we will give reasons for our decisions and will give an account of how the views of those concerned helped shape those decisions.

Annex 3

Consultation response cover sheet

- A3.1 In the interests of transparency and good regulatory practice, we will publish all consultation responses in full on our website, www.ofcom.org.uk.
- A3.2 We have produced a coversheet for responses (see below) and would be very grateful if you could send one with your response (this is incorporated into the online web form if you respond in this way). This will speed up our processing of responses, and help to maintain confidentiality where appropriate.
- A3.3 The quality of consultation can be enhanced by publishing responses before the consultation period closes. In particular, this can help those individuals and organisations with limited resources or familiarity with the issues to respond in a more informed way. Therefore Ofcom would encourage respondents to complete their coversheet in a way that allows Ofcom to publish their responses upon receipt, rather than waiting until the consultation period has ended.
- A3.4 We strongly prefer to receive responses via the online web form which incorporates the coversheet. If you are responding via email, post or fax you can download an electronic copy of this coversheet in Word or RTF format from the 'Consultations' section of our website at www.ofcom.org.uk/consult/.
- A3.5 Please put any parts of your response you consider should be kept confidential in a separate annex to your response and include your reasons why this part of your response should not be published. This can include information such as your personal background and experience. If you want your name, address, other contact details, or job title to remain confidential, please provide them in your cover sheet only, so that we don't have to edit your response.

Cover sheet for response to an Ofcom consultation

BASIC DETAILS

Consultation title:

To (Ofcom contact):

Name of respondent:

Representing (self or organisation/s):

Address (if not received by email):

CONFIDENTIALITY

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

Nothing	<input type="checkbox"/>	Name/contact details/job title	<input type="checkbox"/>
Whole response	<input type="checkbox"/>	Organisation	<input type="checkbox"/>
Part of the response	<input type="checkbox"/>	If there is no separate annex, which parts?	

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

DECLARATION

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

Ofcom seeks to publish responses on receipt. If your response is non-confidential (in whole or in part), and you would prefer us to publish your response only once the consultation has ended, please tick here.

Name

Signed (if hard copy)

Annex 4

Consultation questions

Frequency bands

Question 1. Do you have any comments on our proposal to make C and Ka band frequencies available for TES licensing?

Licensing Arrangements

Question 2. Do you have any comments on the proposed arrangements for licensing, clearance and authorisation of TES?

Licence Fees

Question 3. Do you have any comments on the proposed fees for Transportable Earth Station licences in C and Ka band?

Annex 5

Derivation of Proposed TES Licence Fees

- A5.1 In Section 3, we described the licence fees that we propose to introduce for TES equipment using the additional C and Ka band frequencies. The proposed fees are derived on the same basis as those for Ku band TES equipment and are therefore calculated according to the fee algorithm for the Satellite (Permanent Earth Station) (PES) licence.
- A5.2 By applying the assumptions described in Section 3 and substituting the relevant values into the Satellite (PES) fee algorithm, we derive the proposed TES licence fees shown in Table 6, Section 3. A detailed breakdown of the calculation along with the proposed licence fees are shown in Table 7 below. The resulting fee value is rounded to the nearest £100.

Table 7. Derivation of proposed TES licence fees for C and Ka band

	C band	Ku band	Ka band
	Annual licence fee per earth station	Annual licence fee per earth station	Annual licence fee per earth station
Category 1	£ 500 $[28 \times 1.72 \times \sqrt{(100)}]$ = £482]	£ 300	£ 200 $[28 \times 0.6 \times \sqrt{(100)}]$ = £168]
Category 2	£ 2,400 $[28 \times 1.72 \times \sqrt{(2500)}]$ = £2408]	£ 1,400	£ 800 $[28 \times 0.6 \times \sqrt{(2500)}]$ = £840]
Category 3	£ 7,400 $[28 \times 1.72 \times \sqrt{(23400)}]$ = £7367]	£ 4,300	£ 2,600 $[28 \times 0.6 \times \sqrt{(23400)}]$ = £2570]

Annex 6

Example TES licence Fees

Example 1

- A6.1 An operator has three transportable earth stations that each operate with a maximum power of 60 watts and maximum bandwidth of 9 MHz. Two of the earth stations operate in Ku band and the third one operates in Ka band.
- A6.2 The product of power and bandwidth ($P \times BW$) for each earth station is $60 \times 9 = 540$. This falls in the range applicable to a Category 2 TES licence ($100 < P \times BW \leq 2,500$). The annual fee for a single Category 2 earth station in Ku band is £1,400 and the annual fee for a single Category 2 earth station in Ka band is £800.
- A6.3 The annual licence fee for this Category 2 licence is therefore $\text{£}1,400 + \text{£}1,400 + \text{£}800$, which is **£3,600**.

Example 2

- A6.4 An operator has five transportable earth stations, each with different power and bandwidth characteristics and frequency bands of operation as shown in the table below. The annual fee for each earth station is shown in the last column of the table.

	maximum equipment power (Watts)	maximum bandwidth (MHz)	$P \times BW$	Licence Category	Frequency band	Annual fee
Earth Station 1	20	3.5	70	Cat 1	C band	£500
Earth Station 2	100	18	1,800	Cat 2	Ka band	£800
Earth Station 3	25	1	25	Cat 1	Ku band	£300
Earth Station 4	300	36	10,800	Cat 3	Ka band	£2,600
Earth Station 5	50	9	450	Cat 2	C band	£2,400

- A6.5 Because all three licence categories are covered by at least one of the five earth stations, three separate TES licences are required – a Category 1 TES licence, a Category 2 TES licence and a Category 3 TES licence.
- A6.6 The Category 1 TES licence will cover Earth Stations 1 and 3. The annual licence fee for this licence is $\text{£}500 + \text{£}300$, which is **£800**.
- A6.7 The Category 2 TES licence will cover Earth Stations 2 and 5. The annual licence fee for this licence is $\text{£}800 + \text{£}2,400$, which is **£3,200**.
- A6.8 The Category 3 TES licence will cover Earth Station 4. The annual licence fee for this licence is **£2,600**.

Example 3

- A6.9 An operator has two transportable earth stations that each operate with a maximum power of 200 watts and maximum bandwidth of 30 MHz. One earth station operates in C band and the other one operates in Ka band.
- A6.10 The product of power and bandwidth ($P \times BW$) for each earth station is $200 \times 30 = 6,000$. This falls in the range applicable to a Category 3 TES licence ($2,500 < P \times BW$). The annual fee for a single Category 3 earth station in C band is £7,400 and the annual fee for a single Category 3 earth station in Ka band is £2,600.
- A6.11 The operator requests a short-term licence, valid from 20 November 2010 to 12 January 2011. The period of validity spans three calendar months and therefore the licence is charged at $3/12$ of the annual licence fee.
- A6.12 The licence fee for this short-term Category 3 licence is therefore $£7,400 + £2,600$ multiplied by $3/12$, which is **£2,500**.