



Response to Ofcom's consultation on:

**Improving consumer access to mobile services
at 3.6 GHz to 3.8 GHz**

(Issued by Ofcom on 28 July 2017)

**BT plc and EE Ltd
22 September 2017**

Executive Summary

1. BT/EE welcomes Ofcom's decision to make the 3.6 – 3.8 GHz (3.7 GHz) band available for mobile use as soon as practicable. We applaud Ofcom's proposal to clear the existing fixed links and protected satellite reception from the band by mid-2020 and the benefits this will bring to UK consumers¹. We believe Ofcom's plan to be robust and clearance of the band by mid-2020 to be realistic.
2. The 3.7 GHz band is important for provision of 5G mobile services and should be made available for this use as soon as possible. Ideally it would be made available for 5G in a similar time frame to the adjacent 3.4 – 3.6 GHz (3.4 GHz) band, given that we expect all mobile devices that support 3.4 GHz will also support 3.7 GHz.
3. Ofcom says it is minded to award the remaining 116 MHz of 3.7 GHz spectrum in a combined award with 700MHz spectrum in 2019. We welcome this intent but are of the view that an earlier award of the 3.7 GHz spectrum, alongside the similar 3.4 GHz spectrum, would deliver an efficient allocation of 5G spectrum, less fragmented assignments and would enable the widest possible channel bandwidths. The case for such a combined 3.4GHz and 3.7GHz (and possibly 700MHz) auction has become highly compelling given the numerous delays to the award of the 3.4 GHz spectrum.
4. In light of the confirmed decision to make the 3.7 GHz band available for mobile, we welcome Ofcom's decision not to issue any *new* fixed link licence or any new fixed satellite assignments that require protection in the 3.7 GHz band.
5. BT/EE agrees with Ofcom's proposal to formally give notice to revoke *existing* fixed links licences and fully supports Ofcom's aim to engage with the licensees to work to migrate the links to new frequencies by 1 June 2020. We urge Ofcom to proactively work with the licensees to facilitate an early migration to new frequencies or other technical solutions. If compensation could further accelerate clearance of the few remaining links, we consider this could be justified by Ofcom to Government and should be urgently pursued.
6. BT/EE agrees with Ofcom's proposal to allow continued interference protection for existing receiver frequencies at existing satellite Earth stations for a period of up to three years, noting that unprotected reception would remain possible thereafter.
7. BT has recently reduced its reliance on the 3.7 GHz band for satellite services, but does still have some limited but important remaining use at its Madley Earth station site. We will migrate this use to the adjacent 3.8 - 4.2 GHz band, subject to resolution of relevant technical and commercial aspects which should be achievable within the next three years.
8. In order to promote and support migration of existing satellite use out of 3.7 GHz, and to give confidence to make further new investments in satellite systems, it is important that Ofcom provides assurances to satellite network operators about the continued availability of the adjacent 3.8 - 4.2 GHz band. In our case this is of particular interest for our existing Earth station site at Madley in Herefordshire.

¹ If this is achieved then the 3.7GHz spectrum would fall within the same "second transition period" where, according to its July 2017 Statement on the 2.3/3.4GHz award, Ofcom considers 3.4GHz and 700MHz spectrum will become useable for mobile.

9. Finally, BT/EE agrees the pragmatic proposal to include some restrictions in mobile licences if necessary to protect satellite use in the 3.8 – 4.2 GHz band. However, any such restrictions should be carefully determined to limit mobile use in the immediate vicinity of satellite Earth station sites only where that would not preclude mobile use to any significant extent.

1. Introduction

In our response to the previous consultation on the 3.6 – 3.8 GHz band (3.7 GHz) we strongly supported Ofcom's proposal to make the band available for mobile, including 5G. We now welcome Ofcom's decision to confirm this and the plans to underpin this by not issuing further fixed link and satellite licences in this band. We fully support Ofcom's intention to accelerate clearance of all existing services that would preclude mobile use, by mid-2020. We believe Ofcom has produced a robust and credible plan for early clearance of the band and that Ofcom should proceed as swiftly as possible to do so.

Our previous response also explained that our limited, but important, use of the 3.7 GHz band for satellite reception at our Madley site in Herefordshire would be adversely affected if Ofcom were to no longer protect the receive frequencies from interference. In advance of and following the release of the previous Ofcom consultation we have managed to cease or migrate most of our satellite use from the 3.7 GHz band. We are now exploring options for migrating the limited remaining use and aim to complete this as soon as possible, noting Ofcom's proposal to continue Earth station receiver protection for up to 3 years.

We believe that the 3.7 GHz band is an important band for 5G deployments in the UK and that it is feasible to make it available in all or virtually all parts of the UK by 2020 with appropriate efforts from Ofcom and industry.

We encourage Ofcom to consider an alternative and more holistic approach to awarding 5G spectrum, namely combining the 3.7 GHz award with 3.4 GHz, along with a sensible rationalisation of existing UK Broadband/Three spectrum assignments. This could now deliver a more efficient allocation and therefore more efficient use of spectrum. It is also more likely to promote competition in 5G services in the UK. We encourage Ofcom to not rule this option out and believe this proposal has now become particularly compelling given the numerous delays to the award of the 3.4GHz spectrum.

We look forward to working with Ofcom to move this important work to release the 3.7 GHz band forward to the benefit of customers and the successful implementation of 5G mobile within the UK.

2. An early clearance of the 3.7 GHz band for 5G should be pursued

The 3.4 - 3.8 GHz band is widely seen as the first band suitable to support wide scale 5G deployments. Along with the 3.4 GHz, the 3.7 GHz band is therefore a very high priority for release if early 5G deployment is to be achieved with the best possible customer experience.

Given the decision to make the 3.7 GHz band available for mobile and its importance to meet the Government's objectives for the UK to be a leader in 5G, it is important to accelerate work to clear the band so that it is available in a similar time frame as the 3.4 GHz band. We support Ofcom's proposals that would achieve this by mid-2020 and suggest that Ofcom seeks Government support for any measures that may accelerate this process.

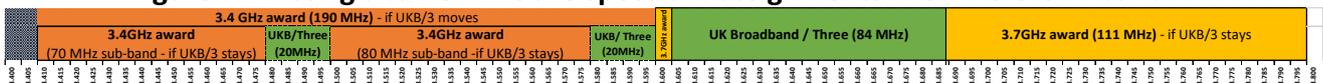
Early availability of the 3.7 GHz band for mobile is critically important if the UK is to be a leader in 5G. But to deliver a compelling 5G experience that is significantly better than 4G, availability of contiguous spectrum that can support the wide channel bandwidths is required. Ofcom has explained in its Statement on the 2.3 GHz and 3.4 GHz award that it considers that an operator needs 80 MHz of 3.4GHz to deliver 5G. 3GPP is standardising 5G at present and is specifying channel bandwidths of up to 100 MHz for equipment in bands below 6GHz, consistent with the ITU considerations of spectrum required for IMT-2020. Given these 5G bandwidths it is clearly advantageous to jointly award the 3.4 - 3.8 GHz band to maximise the opportunity for large contiguous assignments.

3. Potential to combine the 3.4 GHz and 3.7 GHz awards

Ofcom’s current plan is to award 3.4 GHz with 2.3 GHz in 2017 and to separately award 3.7 GHz in combination with 700 MHz in 2019.

If the entire 3.4 – 3.8 GHz range is examined (see figure 1 below), it is apparent that separate awards of 3.4 GHz and 3.7 GHz spectrum, with UK Broadband Ltd potentially assigned three or more separate parts of the 3.4 - 3.8 GHz band (with only 5MHz of unused spectrum separating their assignments at the 3.6 GHz boundary) is unlikely to deliver wide contiguous spectrum allocations to four MNOs in the UK.

Figure 1: Existing and new mobile spectrum assignments in 3.4 - 3.8 GHz band



Any measures to combine 3.4 and 3.7 GHz awards, make 3.7 GHz available for mobile nationally as soon as possible and consolidate / relocate the existing UK Broadband assignments², could improve the possibility for operators to secure spectrum that is optimal for 5G implementation. This would facilitate the leadership in 5G that UK industry and Government strive to achieve.

We do not believe it is realistic to expect that spectrum swaps or trades in the secondary market could work to reassign holdings in the 3.4 GHz and 3.7 GHz bands once they had been assigned with several licensees holding non-contiguous assignments. This would be particularly difficult if the 3.4 GHz band had been assigned two years ahead of the 3.7 GHz band. Licensees who had won the assignments in 3.4 GHz would already have made deployment decisions by the time the 3.7 GHz was awarded, which would be costly and time consuming to unwind. (If 3.4 GHz licensees weren’t expected to make such deployment decisions ahead of a 3.7 GHz award, there would seem little reason to award 3.4 GHz early.)

If Ofcom were to decide to award all of the 3.4 - 3.8 GHz spectrum together, it would be optimal to also include 700MHz in the same award and to do this in 2018. However, if that would delay the 3.4 - 3.8 GHz award then a separate 700MHz auction would be acceptable to us providing there are no unresolved competition measures that link the bands.

² If the UK Broadband licence remains in two separate assignments within the 3.4 GHz band the auction winners will need to fit within two separate blocks of 70MHz and 80MHz, risking a winner receiving an assignment split across these two sub-bands, which is not optimal for 5G delivery.

We acknowledge that the 2.3 GHz spectrum can be used now and as such should be awarded as soon as possible and understand this would be done first and separately if the 3.4 - 3.8 GHz band were combined as we have suggested.

4. UK Broadband spectrum

BT/EE notes that Ofcom intends to consider the issues relating to the UK Broadband licence in the 3.7 GHz band and consult on proposals at a later date if necessary. It is important to us that Ofcom is more specific in terms of its intentions, for example if the remaining parts of the 3.7 GHz band not assigned to UKB are to be auctioned, does Ofcom intend to require them to bid for where they are re-assigned in the band? This is important as the 5 MHz of spectrum between the existing UKB assignments at the 3.6 GHz boundary is likely to only be useable by UKB if their assignments remain where they are, but if their assignments may change it may be of interest to other parties. If the UKB 3.7GHz assignment may move then 116 MHz rather than 111 MHz of contiguous spectrum could be made available.

We note that Ofcom has previously indicated that spectrum fees will be payable from mid-2018 for the UKB assignments in the 3.4GHz band and that the 3.7GHz assignments currently have annual fees not based on opportunity cost of mobile. We note also that Ofcom may consider harmonising the coordination requirements within the existing UKB licence with those of other spectrum awarded in the band. We will provide our views on these matters when Ofcom consults on them.

5. Response to the consultation questions

Question 1: Do you agree with our proposed approach towards registered fixed link and satellite earth stations users of the 3.6GHz to 3.8GHz band?

BT/EE supports Ofcom's proposals as to how it would plan to implement the "Option B" to deal with existing services that operate in the band. The approach set out would be compatible with an auction of the remaining 3.6 – 3.8 GHz spectrum alongside the 700MHz band in 2019. Ideally the 3.6 – 3.8GHz spectrum would be awarded with the similar 3.4 – 3.6 GHz spectrum band since this could result in a less fragmented assignment of 5G spectrum and the likelihood of wider channel bandwidths.

The proposal to revoke fixed links with 5 years' notice is supported by BT/EE. We also welcome that Ofcom will work with the affected licensees to try to identify other solutions for the affected existing fixed links and the aim to migrate these existing links by 1 June 2020. We fully support this aim and encourage Ofcom to consider all options to secure this objective. For example, if compensation could further accelerate clearance of the band we consider this could be justified by Ofcom to Government and should not be ruled out.

We consider that the proposal to give 3 years' notice for removing protection of satellite Earth station receivers is reasonable given the intention to auction the spectrum in 2019. However, it is essential that Ofcom clarifies its position (which should be a straightforward task achievable in the timescales envisaged) on the adjacent 3.8 - 4.2 GHz band since this is

the obvious new home for the existing satellite assignments that need to move. Again Ofcom should consider whether compensation could accelerate the migration of existing satellite services in the band.

Finally, we consider that restrictions in mobile licences should be carefully determined to give reasonable protection in immediate vicinity of satellite sites without prejudicing mobile use to any material extent. This would be important to avoid interference to the adjacent 3.8-4.2GHz band. The necessary distance from the Earth station sites for which restrictions in mobile licences could be appropriate will depend somewhat on the exact interference scenario and relevant technical parameters. We expect this distance should be small (*e.g.* c.1km) and note that similar distances are mentioned in past compatibility work within CEPT that looked at interference to C-band Earth station receivers from broadband wireless systems³. We would be happy to engage with Ofcom on any further technical work to determine the exact restrictions that may be justified.

Question 2: Do you have any comments on our assessment of the likely costs and benefits of our proposed approach?

BT has already substantially reduced its use of the 3.6-3.8 GHz band but does have some remaining use that would be affected by the proposal to remove protection from interference within 3 years. It is not just the costs of moving to new frequencies but other complexities that must be resolved in order to migrate the remaining services, including licensing issues for the transmitting Earth stations outside the UK. However, we are working to achieve migration of the existing use by 2020.

We don't currently consider it to be viable to continue to operate unprotected receive services but note that this remains an option even after the three years' notice period.

³ See ECC Report 100 section 5.4.3 <http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCREP100.PDF>