Non-confidential

Enabling Satellite Direct to Device services in Mobile spectrum bands

BT's response to Ofcom's consultation issued on 25 March 2025

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BT Group

Contents

Executive summary

1. BT is pleased to provide its views on Ofcom's proposals to authorise D2D satellite services to mobile handsets using spectrum bands below 3 GHz licensed to UK MNOs.
2. **BT agrees with Ofcom's position of facilitating satellite D2D use of terrestrial mobile bands on a secondary basis** and subject to a commercial agreement with the relevant national MNO that holds a spectrum access licence in the relevant band.
3. In the absence of a comprehensive international regulatory framework for D2D, including for protection of terrestrial networks from undue interference, it is **helpful that Ofcom puts in place interim regulatory measures**, and that it will update those as necessary to align with the outcome of the ITU WRC-27 agenda Item 1.13[1].
4. BT considers that, to the extent that it is technically feasible**, 999 or 112 calls should be available to users via a non-terrestrial network (NTN) in the same way as it is for UK MNOs**.
5. **Protection of terrestrial networks from interference from satellites, is of paramount importance**. We support Ofcom's general approach to calculation of satellite PFD values, but consider more stringent levels are needed to properly protect a range of user devices from downlink interference.
6. **On the protection of adjacent band services, we agree with Ofcom's preliminary assessments.** BT considers that satellite D2D operations should be compatible with required protection of adjacent band services. Additional information is given Annex 1.
7. **For authorisation of satellite D2D spectrum use, we prefer the simpler of the proposed options** (licence-exemption of devices).

[1] to consider studies on possible new allocations to the mobile-satellite service for direct connectivity between space stations and International Mobile Telecommunications (IMT) user equipment to complement terrestrial IMT network coverage, in accordance with Resolution **253 (WRC-23)**;

1 Introduction

BT welcomes Ofcom's proposals[2] for authorising satellite Direct to Device (D2D) services in the UK, in mobile spectrum bands below 3 GHz, licenced to mobile network operators (MNOs) for terrestrial mobile networks.

In **section 2** we respond to Ofcom's explanation of its proposals at high level on enabling D2D in the UK, including consideration of business models.

In **section 3** we provide our views on how Ofcom should manage interference between satellite D2D networks and terrestrial mobile networks.

In **section 4** we respond to the options for authorising satellite D2D spectrum use.

In **section 5** we address the proposed licence conditions.

Finally, in **section 6** we discuss possible next steps.

2 Enabling D2D in the UK and business models

BT welcomes Ofcom's leadership in developing an appropriate regulatory framework for satellite D2D, in the absence of a suitable harmonised European approach and international frameworks that may emerge as a result of the ITU WRC-27 agenda item 1.13.

We support Ofcom's position of facilitating satellite D2D use of terrestrial mobile bands on a secondary basis, subject to a commercial agreement with the relevant national MNO that holds a spectrum access licence in the relevant band.

Question 1:

Do you agree with our assessment of the business models that could potentially emerge?

Yes, BT agrees with Ofcom's assessment of the business models that could potentially emerge.

[2] https://www.ofcom.org.uk/siteassets/resources/documents/consultations/category-1-10-weeks/consultation-enabling-satellite-direct-to-device-services-in-mobile-spectrum-bands/main-documents/consultation-enabling-satellite-direct-to-device-services-in-mobile-spectrum-bands.pdf

Question 1(a):

Are there any other business models that you think could deliver benefits for people and businesses in the UK?

BT has no comments on this question.

Question 1(b):

Are there any business models that could not operate under our proposed approaches?

A satellite D2D service without MNO involvement would not be possible, as the satellite D2D use should not take place in MNO spectrum, without agreement.

Question 2:

Do you agree with our assessment of the benefits that could be realised through authorisation of D2D services?

Yes, BT agrees with Ofcom's assessment of the benefits that could arise if satellite D2D solutions are facilitated in the UK.

We note that it may be some time before the full benefits are realised, as the satellite D2D technology progresses.

Question 2(a):

Are there any other benefits for UK citizens and businesses that could be realised?

BT has no comments on this question.

Question 3:

Do you have comments on how emerging D2D technology should support 999 service provision?

Access for emergency calls over satellite is essential, to increase safety and emergency access for all.

BT considers that, to the extent that it is technically feasible, 999 or 112 calls should be available to users via an NTN, in the same way as it is for UK MNOs. That includes the obligation to route 999 or 112 calls, for free, if the end user device supports the frequencies used to provide satellite mobile coverage, irrespective of the terrestrial mobile broadband provider subscribed to by the end user. It must also include any obligation to interoperate with Emergency Location provision, as per relevant UK interoperability standards (including, but not limited to, ETSI 103 625).

Question 4:

Are there any mobile spectrum bands not in scope of our proposals that you think we should consider?

No, BT agrees with the spectrum bands that Ofcom has selected for consideration.

Question 5:

Does deployment in supplementary downlink spectrum (SDL) present any challenges in comparison to other bands? Is there interest in deploying in this spectrum?

BT has no information that SDL spectrum presents challenges in comparison to other bands. {✂ }.

Question 6:

Do you agree with our proposal to limit this authorisation to the UK mainland and territorial waters? If not, please explain why.

We understand UK mainland to comprise Scotland, England and Wales and Northern Ireland, including all islands of those nations, e.g. the Isle of Wight and Scottish Islands.

3 Managing spectrum interference

BT encourages Ofcom to align with any technical conditions emerging from the ECC PT1 discussions on European proposals to the upcoming WRC-27 conference.

BT agrees PFD limits should be reviewed after the WRC-27 outcome is known, in light of ongoing work in CEPT and ITU on this topic.

Question 7:

Do you agree that our proposed technical conditions for D2D satellite emissions will protect mobile services delivered by other operators in adjacent areas and in adjacent spectrum?

BT's response to this question is set out below, considering protection of both mobile devices and base stations, although it is protection of mobile devices that is most relevant given that neighbouring countries use similar frequency arrangements to the UK.

Calculation of PFD limits

BT notes that work is underway in CEPT ECC PT1 and ITU-R WP5D to develop regulatory measures to protect terrestrial mobile networks from interference as part of the WRC-23 Agenda Item 1.13 preparations. The latest WP5D working document[3] contains several options that are under discussion.

Ofcom's method is consistent with one of the options under consideration in the international discussions, although it does not address interference potentially from multiple satellite

[3] Annex 4.6 to Document 5D/563, 24 February 2025 https://www.itu.int/dms_ties/itu-r/md/23/wp5d/c/R23-WP5D-C-0563!H4-N4.06!MSW-E.docx

systems. We also note Ofcom considers the aggregate PFD value from multiple satellites with a system rather than a per satellite value[4].

Satellite PFD limits to protect mobile devices

BT has the following comments in relation to Ofcom's proposed PFD values for protecting mobile user equipment:

User antenna gain

Ofcom proposes to use -3dBi, citing the ITU document 5D/716[5]. We note that in that document this is a "typical" gain for user terminal. This may be reasonable when considering the aggregate interference impact of a large number of terminals, but for the purpose of determining PFD values to protect mobile user equipment, a more conservative approach is appropriate. BT proposes a higher value of receive antenna gain is used[6].

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Fixed Wireless Access terminals used in mobile bands can have significantly higher receive antenna gain, compared to a typical mobile device, and may require a lower satellite PFD value, to be sufficiently protected from the risk of interference.

Aerial UEs on drones, could similarly have higher antenna gains than -3dBi, now or in future.

BT therefore considers that the assumed device receive antenna gain used to determine PFD value, should be a higher value than -3 dBi, with a minimum of 2 dBi, at least in coverage bands.

Multiple satellite networks

The possibility of interference from multiple satellite networks needs to be taken into consideration, especially in the longer term when multiple satellite systems may operate in the same bands when serving different areas. In the multi-MNO proposals to ITU, a 3dB factor has been proposed to account for multiple satellite systems.

PFD levels to protect mobile user equipment

We ask Ofcom to consider the above points about antenna gain and multiple satellite networks before concluding on PFD values to protect mobile user equipment. This would suggest, PFD values of 8 dB lower than those proposed by Ofcom, for protecting mobile user equipment,

[4] BT accepts that a higher value may be justified in the short term compared to the future when a greater number of D2D systems may be deployed.

[5] Table 5-2 in https://www.itu.int/dms_ties/itu-r/md/19/wp5d/c/R19-WP5D-C-0716!H4-N4.04!MSW-E.docx

[6] ECC Report 256 mentions " In LTE networks, the standard receiving antenna of a mobile device is assumed to be omnidirectional and has a gain of 0 dBi (relative to an isotropic radiator)." https://docdb.cept.org/download/1280

should be applied for protection from co-channel interference, in border regions and adjacent block interference within the same geographic area.

It will also be necessary to consider how the per satellite PFD will be regulated, to ensure that the aggregate PFD meets the necessary thresholds or limits.

Satellite PFD limits to protect mobile base stations

Methods for protection of mobile base stations from satellite interference are under discussion within the CEPT and ITU. The base station scenario is more complex than for mobile, because base station antenna radiation pattern is highly relevant to the interference calculations.

The translation of interference PFD levels to received power for various elevation angles, as Ofcom has derived and presented in Table A3.4 of the consultation document, will need to be considered in terms of multiple visible satellites and satellite systems. The table entries are maximum PFDs, that would be allowed, if there was one satellite, one satellite system, at one of the elevations listed in the table.

In reality, each visible satellite generating some specific PFD at a certain elevation angle at any instant in time will need to be considered, and the power appropriately aggregated, taking into account the incident PFD, and the base station antenna gain, at the relevant elevation angle to each given satellite. Quite how this can be predicted, and then regulated for specific satellite systems, is a challenge that will need to be addressed.

In terms of the parameter values that Ofcom has assumed in its PFD value calculations, BT notes one significant difference in the assumptions Ofcom has used, compared to the multi-MNO contribution to the ITU work. Ofcom has assumed an antenna mechanical downtilt of 3 degrees, whereas the MNOs' proposal is to use an assumption of 0 degrees, to achieve the most adequate protection levels.

Question 8:

Do you agree with our high-level co-existence assessment for other services in adjacent spectrum to D2D?

Yes, we agree with Ofcom's assessment but provide further information specific to one frequency band in Annex 1.

Question 9:

Are there other services co-channel or in adjacent spectrum that you think we should take into account when assessing coexistence? If so, please provide evidence of the nature of interference and what level of protection you consider is necessary.

Ofcom has correctly identified the adjacent band services to be considered.

4 Approach to authorisation

Question 10:

Do you agree with our preferred authorisation approach (option 2)? If not, please set out your reasoning.

Views on Option 1

BT sees merit in Ofcom's authorisation Option 1. This is a relatively straightforward solution of a licence-exemption regulation for mobile devices transmitting to satellites providing D2D connectivity, without needing to add new clauses to the MNO's existing Spectrum Access licence, associated with terrestrial networks.

The licence-exemption should, however, clearly specify that it is only valid for transmissions from the mobile device up to a satellite, when used with a valid SIM issued by a UK MNO that enables the device to be authenticated, and if a commercial and technical arrangement exists, connect to a satellite network using the frequencies for which the MNO issuing the SIM holds a spectrum access licence.

The regulation would likely need to also cover devices with SIMs issued by MVNO partners of the UK MNO, where there is an agreement with the MNO to extend to use of satellite coverage to customers of MVNO, and also devices with SIMs authorised to roam onto the MNO's network (international roaming).

Views on Option 2

Changes to the UK MNO licence to include a clause requiring a commercial agreement between MNO and a satellite operator, specifying required adherence to downlink PFD limits of satellite transmissions defined by Ofcom, as a pre-condition of Ofcom making a licence-exemption regulation for the mobile devices when operating to an orbiting satellite, is unnecessary. Ofcom acknowledges that it does not have powers to authorise the transmissions from satellites. Option 2 may therefore go beyond Ofcom's power under the WT Act. BT is concerned about implications if the MNOs were to cease their commercial arrangement, or switching to another satellite operator.

Question 11:

Are there any alternative authorisation options, not discussed here, that you believe are worth considering?

No, see response to Q10.

5 Proposed licence conditions

Question 12:

Do you agree with the proposed conditions?

Yes, but review technical conditions after WRC-27.

6 Proposed next steps

Question 13:

Do you have any other comments on the proposals set out in this document?

BT has no further comments.

Annex 1 {✂ }

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