Three's response to Ofcom's consultation: Improving mobile connectivity from sky and space

Non-confidential

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Executive Summary.

Three welcomes the opportunity to respond to Ofcom's consultation on spectrum for Direct to Device and Mobile Satellite Services.

The Consultation aims to gather views on the potential demand for direct-device-services (D2D) in the UK and the corresponding spectrum requirements. The Consultation is also exploring possible spectrum authorisation options for D2D services in the UK ahead of WRC-27, considering that initial D2D services could become available in the country within the next few years.

We recognise that new satellite D2D services have the potential to improve connectivity globally by extending mobile coverage to remote areas and providing back-up when there are outages on terrestrial networks.

However, D2D is most beneficial in countries with large areas unserved by terrestrial networks. The UK is relatively densely populated with 93% of the landmass covered by at least one operator. As a result, we expect that the potential benefit of D2D services for UK consumers and businesses will be mostly in rural and hard-to-reach areas.

In the UK, the most suitable application for D2D services would be as an emergency service, a back-up solution for network outages or offered as a premium feature for customers who want coverage in remote areas.

The introduction of D2D services within terrestrial mobile bands could raise the risk of interference between satellites and the base stations of MNOs holding the spectrum, potentially resulting in degraded service for mobile users.

Therefore, if Ofcom were to introduce a UK authorisation framework ahead of WRC-27, we recommend that Ofcom adopt a similar approach to the framework proposed by the FCC in the United States, which recommends:

a) That a satellite operator may only provide a D2D service if it has leased spectrum from the incumbent MNO and;

b) Applicants wishing to launch these services will be required to provide detailed interference analysis showing that operations will not cause harmful interference to adjacent band and cross-border uses.

Our response to the Consultation questions are provided in the section below.

Response to Ofcom's specific questions.

Question 1: What is the market opportunity for D2D services? What is the nature of the benefits that could be delivered to people and business in the UK and what do you estimate the magnitude of the benefits to be?

We recognise that new satellite D2D services have the potential to improve connectivity globally by extending mobile coverage to remote areas and providing back-up when there are outages on terrestrial networks.

However, in the UK, around 93% of the landmass is covered by at least one operator.[1] As a result, the potential benefit of D2D services for UK consumers and businesses would mostly be:

    a) Offering it as a premium feature or add-on for customers needing coverage in remote areas.
    b) Improve access to emergency '999' services in more remote parts of the UK.
    c) Act as a back-up coverage during power or network outages to provide greater level of resilience

Question 2: Are there any wider citizen or societal benefits that D2D services could deliver that the market might not deliver? What is the nature of these benefits and why might the market fail to deliver them? For example, what role could D2D have in improving the availability of 999 services in the UK?

Three has no comments.

Question 3: Subject to suitable regulatory frameworks being in place, do you have an interest in offering D2D services or expanding an existing service, in the UK? Which customer segments, devices and use cases would be served? Would your D2D service complement or compete with services delivered over existing mobile?

Three has no comments.

Question 4: What technology and network architecture do you consider appropriate to use to deliver D2D services? For example, what altitude and how many HAPS, LAPS or satellites would be required to deliver an initial service?

Three has no comments.

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[1] Connected Nations update: Spring 2024 - Ofcom

Question 5: *What capacity (e.g., Mbps/Km2/MHz) and quality of service (e.g., latency) could be delivered with the D2D service you are proposing? What percentage of the UK landmass could be covered, and would coverage be provided indoors?*

Three has no comments.

Question 6: *To inform our future policy development, which spectrum band would you like to deploy the service in? How much bandwidth would be required to provide the service at launch?*

Three has no comments.

Question 7: *What take-up profile do you assume in your planning? For example, the number of active devices, monthly calls made, and data transferred per device. What is the roadmap for enhancing your network to meet anticipated future growth? What additional infrastructure and/or spectrum would be required? When?*

Three has no comments.

Question 8: *What are the use cases and the benefits these services would deliver? What technology, network infrastructure and frequencies would be required to deliver the service? What are the advantages of using this MSS spectrum compared to other bands?*

Three has no comments.

Question 9: *What current, or future, technology developments will offer the opportunity for more efficient use of MSS spectrum? E.g., more spectrally efficient, or greater ability to share spectrum.*

Three has no comments.

Question 10: *Could your existing, or proposed, service coexist with other users of the same frequencies within the MSS spectrum bands? If so, how is coexistence achieved? If not, please explain why sharing is not possible.*

Three has no comments.

Question 11: *Do you expect D2D services to be available prior to WRC-27? What services and benefits do you think an authorisation prior to WRC-27 might bring to UK consumers and businesses?*

Three has no comments.

Question 12: *Are there any mobile bands that should be prioritised for satellite based D2D?*

We believe that low-frequency bands have strong propagation characteristics, enabling signals to travel long distances and penetrate buildings, making them ideal for satellite communications, which require coverage over large areas and both indoor and outdoor reach.

Mid-band frequencies can offer a balance between coverage and data capacity, providing a middle ground compared to low bands and serving as a versatile option for a wide range of services.

However, before prioritising any mobile bands for D2D services, Ofcom should consider that low and mid band spectrums are heavily used by terrestrial networks, posing a significant risk of interference between satellites and ground base stations of MNOs. These risks will need to be mitigated, managed, and monitored as part of any potential authorisation framework Ofcom plans to introduce, along with agreements between MNOs and satellite operators.

Question 13: *Are there existing systems that you consider could be subject to an increased risk of harmful interference from the introduction of satellite based D2D using mobile bands? If yes, are there specific mobile bands that you consider should be avoided to reduce this risk?*

The following systems may face an increased risk of interference from satellite-based D2D services operating in mobile bands:

- Mobile devices and base stations in terrestrial networks using the same frequencies as D2D satellite services could experience an increased risk of interference, particularly in areas with dense satellite coverage. This could result in degraded service for mobile users, such as dropped calls or reduced data speeds.

- Fixed Wireless Access (FWA) systems, particularly in rural areas, which rely on fixed wireless links using the same D2D frequencies, could encounter interference, leading to slower speeds or connectivity issues.

Question 14: *Do you have any views on how spectrum for D2D services should be authorised? Does this vary by band, or type of NTN? Please explain the reasoning behind your preference.*

The licences held by MNOs to provide communication services to consumers do not authorise transmissions from space.[2] MNOs acquire spectrum at considerable cost with the expectation that it will be used without interference or sharing with others.

The deployment of satellite D2D services using mobile spectrum could significantly increase the risk of interference to mobile networks, and this risk is likely to be further complicated if D2D services operate on the same frequencies as the MNOs.

At minimum, If Ofcom introduces a new framework to authorise satellite D2D services in mobile bands, we urge that Ofcom adopt the framework proposed by the FCC for regulating D2D services in the United States[1], which recommends:

- That a satellite operator may only provide a D2D service if it has been leased spectrum from the incumbent mobile network operator.
- Applicants wishing to launch these services will be required to provide detailed interference analysis showing that operations will Not cause harmful interference to adjacent band and cross-border uses.

This approach would encourage satellite operators to collaborate with MNOs when launching D2D services, protect MNOs' spectrum rights, and minimise the risk of harmful interference.

Additionally, Ofcom's potential framework should support and adopt future advancements, recommendations and best practices from key industry bodies (such as 3GPP, WRC27 and ITU) to effectively manage interference between terrestrial and non-terrestrial networks, as well as exploring the establishment of a certification process for devices used in D2D services to ensure equipment meets the technical standards and can operate without causing interference to other users.

Question 15: *Are there any other points that you think would be useful in our considerations? In providing your response, please provide as much evidence as possible.*

Three has no comments.

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[2] Improving mobile connectivity from the sky and space (ofcom.org.uk), para 5.16
[1] DOC-400678A1.pdf (fcc.gov)