Title:

Forename:

Surname:

Representing:

Organisation

Organisation (if applicable):

Ordnance Survey

Email:

What additional details do you want to keep confidential?:

Keep name confidential

If you want part of your response kept confidential, which parts?:

Ofcom may publish a response summary:

Yes

I confirm that I have read the declaration:

Yes

Additional comments:

INTRODUCTION TO ORDNANCE SURVEY
Ordnance Survey is Britain's mapping agency, responsible for creating and updating the definitive mapping and geographic information database of England, Scotland and Wales. We provide services, both in the UK and internationally, to governments and commercial organisations based on our knowledge, skills and understanding of location data and geography.

Established in 1791, Ordnance Survey is today a government-owned company.
Our core business is focused on the collection, creation, maintenance, management and supply of geographic information to meet the needs of all aspects of national infrastructure. In this regard we are heavily relied upon by all utility providers - energy, water and communication infrastructure companies - as well as port, airport and railway operators and the public sector in delivering against regulatory and policy objectives. Ordnance Survey data is fully available to Ofcom at no charge under the terms of the Public Sector Mapping Agreement.

APPRECIATION OF SPECTRUM ISSUES
We are noticing a considerable uptake in the demand for our services caused by the advent of the Internet of Things (IoT), as investors and regulators seek to keep track of assets in the field. We have noted ever-increasing pressure on spectrum resources as the market explodes, with 50 billion IoT devices forecast to be in existence worldwide by 2020. We also note that deployment of 800MHz Long-Term Evolution (LTE) solutions for mobile, together with increasing concerns about congestion in the 2.4GHz band and much of the 'sweet spot' spectrum.
Today the advent of cheaper processing power, combined with big data analytics, makes possible a complete step change in predictive mapping capabilities, even in the millimetre wavebands. OS has the capability to produce a combined spectrum and mapping tool that could save millions of pounds, is far beyond current state of the art, and which could combine traditional coverage prediction tools with predictive mapping techniques. If such a tool could enable the reduction in guard band sizes whilst avoiding interference, then the additional spectrum could have considerable value if auctioned, particularly in the sweet spot.
In light of these factors, we recommend maintaining close dialogue between Ordnance Survey and Ofcom to explore possible interference and infrastructure security issues, which we believe could undermine the effectiveness of IoT deployments. A radically improved mapping tool could be developed which could go a long way towards accelerating IoT deployment in all bands, and not just at VHF frequencies. This is in line with Ofcom's stated ambition in Section 1.2 of this Consultation: 'we want to encourage IoT investment and innovation...' Such a tool could even accelerate 5G deployments in the UK to the benefit of citizens and consumers, as well as making deployments cheaper for operators.
IoT Standardisation too will also have an important role to play in the success or otherwise of narrowband IoT services. It appears that there are two camps within the GSM Association. The first of these is around what is termed 'narrowband cellular'. This is being championed by companies including Huawei and Qualcomm. The second, the 'narrowband LTE' camp, also contains some very credible companies, including Ericsson and Intel. We think that in-band transmission is only possible with narrowband LTE, which may give it an advantage, but no doubt this whole matter will be addressed by 3GPP, and a harmonised solution will hopefully emerge quickly. The sooner investors feel that the standards position is stable, the more quickly they are likely to invest. In light of the above we see merit in Ofcom continuing to monitor standards development closely.

Question 1:Do you agree that the spectrum we have identified (in figures 4.2 and 4.3 above) is suitable for M2M applications for remote and rural locations? Please provide as much information as possible on likely applications.:

We welcome the availability of spectrum for IoT deployments, including particularly the bands identified in this Consultation. They are ideally suited for longer range, low power and longer battery life connectivity, so rural deployments would be most logical. However, the limited capacity at these frequencies could be an issue.
We feel that one cannot yet accurately predict what the impact of this might be, and we also have some concerns about standards and holistic security issues (spanning network to device to chip) that are unresolved at this time. Are they adequate? Today's typical IPv4/ IPv6, TCP, HTTP, TLS environment will not work with sleeping nodes, smaller packet sizes, and lower bandwidths. We believe it is necessary to use 6LoWPAN to resolve addressing issues because we need to preserve universal addressing but with a more efficient protocol. UDP will almost certainly have to be used too, because although simpler it overcomes the 'sleeping node' problem. HTTP will probably be replaced by CoAP (which will work with UDP), and TLS likewise with DTLS. Will this provide adequate security? This we do not know, though the standards do all exist today. This could be a concern.
Government policy favours ever greater broadband deployment everywhere, in a major push to remove network bottlenecks and provide superfast broadband for all. Whilst fibre may well be much more expensive to deploy, we are already aware of a rural community in Yorkshire that first deployed a broadband radio network then replaced it shortly thereafter with fibre to overcome capacity problems. Over time, 'deep fibre' seems to us to be the way the UK will move.
If we then consider in parallel the impact that 5G combined with predictive mapping (if developed) could have, we conclude that it will become easier to user higher reaches of the spectrum, as the radio tails back to trunk fibre infrastructure will progressively shorter. This trend could well impact the economic viability of some services that might be being planned using VHF spectrum.
As for applications, we are not entirely clear how Ofcom defines 'smart farming'. If we are talking about the tracking of individual livestock somehow, is there a market for this, and indeed is there not a sophisticated tracking process already in place to protect the food chain? If we are talking about asset tracking of plant and machinery, we know of both satellite and broadcast mast-based tracking solutions that exist already. If we are discussing crop management, what precisely will the IoT devices do differently to what is currently being done? Overall, what additional value over and above what is already out there would be delivered? We are not clear. To some extent, the same is true of coastal and maritime applications, where international coordination would also be prudent to avoid interference over the long distances devices will be able to operate.

Question 2:Do you agree with our analysis that encouraging new IoT uses in the bands 55.75625-60 MHz, 62.75625-64.8 MHz and 64.8875-66.2 MHz, 70.5-71.5 MHz and 80.0-81.5 MHz should still leave sufficient spectrum to meet demands for Business Radio in the VHF range?:

Trade-offs between competing demands for spectrum have been the harsh reality for many years. There is no 'silver bullet' solution that can change the laws of physics and create more spectrum. We recognise the value that Business Radio brings to the UK; however we believe that Ofcom is well placed to make informed decisions that will use best endeavours to protect the interest of all spectrum users.

Based on Ofcom's comprehensive analysis in the Consultation document, it does appear that there will indeed still be sufficient spectrum to meet the demands for Business Radio in the VHF range. What we remain unclear on, however, is whether we will see the development of new and truly innovative solutions, new substitutes for existing services, or service duplication based on commercial considerations which might damage business plans of existing spectrum users. We support the policy that Ofcom is taking.
Finally, we note in section 5.15 that Ofcom has a review of fees for Business Radio currently underway. If fees increase we might reasonably respect a further drop in demand from existing users.

Question 3:Do you think the conditions associated with the current range of BR licences available now should change to facilitate new IoT services uses? If you do, what should these changes be?:

Allowing IoT services under existing business radio licences would seem to be the logical solution.

Question 4:Do you think we should create a new licence product specifically for IoT services?:

There is merit in keeping things as simple as practicably possible, so as not to deter innovation and competition and to speed up potential commercial benefits that could accrue. Providing interference issues can be efficiently managed then the simplest way would probably be to allow increasing flexibility of existing business radio licences.
The likelihood is that demand, whether licensed or unlicensed, will skyrocket, and our principal concern is that interference that could occur. As discussed in section 2 of our response, we believe that predictive mapping could play a valuable part in minimising interference. Even in the 1990s when 10GHz Fixed Radio Access services were permitted under licence, it was soon discovered that deployment was anything but simple. Illegally imported garage door openers and burglar alarms, traffic light sensors, and legally deployed police speed guns all resulted in an inability to efficiently use parts of the spectrum for the purpose for which it had been designated. We see the same trend now with domestic use of drones. In recent weeks alone there have been several prosecutions of ordinary people using them, but because there is no grasp in the wider population of the potential hazard they cause, coupled with the ease with which they can be acquired, the situation could already be impossible to police. For instance, if an IoT device was being used to monitor a reservoir or a nuclear power plant, and interference prevented a sensor transmitting data when an incident was taking place, the consequences could be catastrophic.
A balance needs to be found between light touch licensing and the need for standards to deliver adequate security levels. The new Radio Equipment Directive could be of assistance in this regard, and in particular the CE marking scheme, with which consumers are already familiar. No mark equals illegal deployment.
We note the comments at section 5.25 of the Consultation that Ofcom could itself hold accurate and up-to-date information on the location of IoT equipment to assist with coordination requirements. The process of coordination would be improved with predictive mapping, and could help Ofcom to use a light touch approach to licensing which could facilitate faster UK deployments.

We also note at 5.28 that Ofcom understands that the '...individual licensing of IoT equipment could be burdensome and potentially involve significant costs'. This does not necessarily follow, though it might. The question would seem to be the opportunity cost of having predictive mapping deployed to facilitate faster and simpler coordination against the possible wider benefits to society of a lighter licensing regime. If the fear of interference could be reduced it would seem that the wider benefits could be modelled and would be very significant.