

techUK response to Ofcom  
consultation: More Radio Spectrum for  
the Internet of Things

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## Introduction

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### About techUK

techUK represents the companies and technologies that are defining today the world that we will live in tomorrow. In a very real sense techUK represents the future.

At the heart of tech in the UK is an ecosystem of 270,000 companies producing digital technologies, products and services. From east to west, north and south, from enterprise class organisations to established medium-sized businesses, growing small businesses and an exciting generation of tech start-ups: the UK is a hotbed of tech talent and techUK exists to represent the sector in its entirety.

Our role as techUK is to ensure that we seize the potential for good and address the disruptive new challenges that change and innovation always present. We work to understand the opportunities that technology provides; to support the companies and innovators that can realise those opportunities.

This underpins our simple vision to ensure that tech is good for the UK, the UK is good for tech and that tech is good for people.

## Summary of techUK position

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techUK welcomes the opportunity to contribute to this consultation. We very much support Ofcom's drive to identify spectrum for Internet of things (IoT). IoT, justifiably referred to as the second digital revolution, has applications across the full range of economic and social activities. Estimates for the global economic value to be expected by 2020 from IoT range from \$1.9 to \$ 14.4 trillion. It is vital that the UK is at the forefront of exploiting the opportunities from IoT - in terms of developing the associated technologies and applications as well as adopting IoT services across the economy and in public services. The early availability of adequate and appropriate spectrum is a vital pre requisite and given the diverse range of IoT networks and applications, a range of spectrum and means of access will be needed.

That said however, in respect of the specific 3 tranches of spectrum in the VHF Band 1 and VHF Low Band ranges identified in this consultation techUK believes that the scope for use by future IoT and M2M systems is very limited because of

- the associated propagation characteristics
- the large antenna size requirement, and the
- non-contiguous and non-harmonised (UK specific) nature

of the bands.

In contrast, for the type of IoT applications being discussed (longer range, low data rate, low power, long battery life), we recognise that Business Radio occupies some excellent radio frequency bands with advantageous propagation conditions (such as higher VHF at 136-196MHz and UHF at 420-470 MHz) which would be of great benefit to IoT deployments.

techUK also believes that in order to be able to allow differing technologies to coexist and to optimise data throughput and efficiency, Ofcom should consider separating voice and data services onto different channel sets and developing a common channel access protocol to enable data services to coexist in a more controlled fashion than the current status quo.

In terms of the discussion (Section 4.13 to 4.18 in the consultation document) on propagation distances, historic and contemporary data collected for these frequency bands suggests significant limitations and variations on the reliably achievable distances. Ofcom should therefore provide some clear guidance to potential operators / licensees on the physical and propagation characteristics of these bands to avoid confusion on suitability.

Finally, given the diverse nature of IoT systems with a comprehensive range of application areas, techUK does not support dedicated / exclusive allocations for IoT / M2M.

## **techUK response to the consultation questions**

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*Q1. 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.*

While appreciating Ofcom's efforts to identify and open up a range of potential spectrum suitable for IoT / M2M type applications, techUK believes that in the case of the identified bands in this consultation, there are severe limitations in their suitability for the applications. These limitations are characterised by large antenna size/location constraints, poor propagation, high electrical noise floors and poor reliability due to atmospheric disturbances. Furthermore, the spectrum being considered is not contiguous, potentially leading to implementation difficulties, and with the limited scope for international harmonisation reduce the scope for vital economies of scale. Indeed it is for these reasons that this spectrum has been minimally used for so long. The antenna size constraint also significantly reduces the suitability for these bands to be used for IoT / M2M sensors. In summary, techUK believes that these constraints make the lower 2 identified bands unsuitable for IoT / M2M applications with only limited potential in the upper band.

In terms of spectrum to enable longer range, low data rate, low power, long battery life IoT applications these requirements could be met with the higher VHF/UHF spectrum available to Business Radio users. These bands are also likely to be more suitable for the sensor applications.

techUK foresees that there are going to be many IoT applications for which guaranteed data transfer is critical. This can only be achieved by using reliable, predictable spectrum, and supported where necessary with area defined or technically assigned licences.

There is a significant amount of higher VHF spectrum already available to Business Radio licensees, which as noted in the consultation is already available to IoT users. This higher VHF spectrum (136 – 196 MHz) is of far greater interest since blocks of this spectrum are available almost universally worldwide on similar exclusively licensed basis, able to be used today by frequency agile modules. It is therefore possible that modules capable of operating in this higher frequency range could be designed and manufactured in sufficient quantities to give the necessary economies of scale worldwide. Furthermore there are also licence free bands in this frequency range, allowing the modules to serve a dual purpose which increases further the economies of scale.

Finally, as elaborated further in the answer to Q 3, we believe that the effective utilisation of such spectrum for Business Radio and IoT applications will be greatly enhanced by the implementation of controlled data protocols developed on

dedicated “data only” channels which would allow a greater degree of sharing between users to take place under far more controlled conditions than the current licence free bands allow. This in effect represents a “halfway house” between a fully exclusive channel and a “free for all” licence free channel.

**Q2.** *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?*

techUK does not have detailed visibility of the demand for Business Radio systems in this spectrum. However given the usage information provided in the consultation document, we tend to concur with your analysis.

**Q3.** *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?*

No. techUK agrees with Ofcom that the current arrangements with the mix of area defined, technically assigned and light licences, are sufficiently flexible to facilitate IoT services. For area defined and technically assigned licences, a first-come first-served process is appropriate. techUK does not support a separate licence category for IoT.

#### Licence Fees:

techUK feels that the licence fee structure should incentivise more effective utilisation of spectrum and reflect the level of congestion in given bands but not differentiate between Business Radio and IoT applications per se. Band I currently enjoys a reduced fee rate which reflects the increased technical and commercial costs of a deployment and the limited usage within this band – in turn encouraging some limited usage since its introduction. We strongly support this. We believe that similarly reduced licence fees for deployments in Lowband would also offset the limited use and increased costs associated with operation in this band. The higher VHF bands appear to be priced at a reasonable level whilst the UHF bands used by Business Radio currently suffer serious spectrum congestion. The fee structure should penalise inefficient wide area Business Radio deployments in UHF that sterilise spectrum across huge areas thereby denying access to other (often Critical) deployments.

#### Technology neutrality, common channel access protocols and maximising voice / data channel usage:

We understand that there are concerns within the Business Radio community with respect to coexistence of voice and data services due to the greatly differing duty cycles. techUK strongly supports “technology neutrality”, providing that differing technologies could co-exist happily.

In order to be able to allow these differing technologies to coexist and to optimise data throughput and efficiency we feel that it may be necessary to separate voice and data services onto different radio frequencies and also to develop a common channel access protocol which could be used to permit data services to coexist in a more controlled fashion than the current status quo.

Currently on Business Radio channels most data services (GPS polling, data dispatch, etc) simply transmit without listening - even if the channel is busy. If this fails the systems then retry using their own custom algorithms. This uncontrolled manner will achieve, at best, around 10% peak capacity, which clearly is a very inefficient use of spectrum. Where greatly differing protocols are used actual throughput can drop to almost zero as the two incompatible protocols cause each other to continually retry, leading to "congestion collapse".

Having a common sharing protocol has been proven in many other areas of data communications to allow efficiencies of over 80% to be achieved in some cases, a significant improvement in terms of throughput and reliability.

We are therefore advocating development of a high level channel access scheme that allows different radio protocols to better co-exist since they will all be behaving in an expected, predictable manner, thereby greatly improving efficiency. We understand much work was done on this in the 1980's by the Radiocommunications Agency and the benefits of such an arrangement have been identified for some time. However work on these protocols ceased around 20 years ago whilst data schemes not following the recommendations made have been deployed in great numbers in the past 15 years.

**Q4.** *Do you think we should create a new licence product specifically for IoT services?*

#### **Draft Answer Q4**

Absolutely not. techUK is supportive of creating a more flexible regulatory environment that proactively enables greater opportunities for new technologies, applications and business models but **techUK is opposed to dedicated / exclusive spectrum for IoT.**

techUK agrees with the position of CEPT –

*So far, there does not seem to be a strong case for the designation of specific frequency bands for M2M communications since most M2M applications existing today or foreseen can be carried over SRD, RLAN, PMR or MFCN (commercial mobile or fixed broadband networks).*

*M2M can be used in a number of frequency bands, using a number of services and radio applications, under both licensed and license-exempt framework. This provides frequency band options for M2M. This means also that no single frequency band defines M2M and should be viewed in isolation per se.*

As mentioned in techUK's response to Q3, techUK agrees with Ofcom in so much "*that the current approach to authorising IoT in these bands is adequate. The three different licence products cater for a range of stakeholder requirements whilst ensuring interference is appropriately managed*".

Furthermore the existing Business Radio licensing regime already allows for spectrum to be assigned on an exclusive basis through the Technically Assigned and Area Defined products. Exclusively assigned spectrum in this manner would allow for logical separation between IoT and BR deployments without the need to restrict either sector to a smaller pool of available spectrum.

techUK suggests that Ofcom may wish to consider educational / promotional activities to raise awareness that Business Radio Licenses can also be used to deploy IoT and that the processes are relatively straight forward.

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