

Ericsson's response to Ofcom's consultation on Improving consumer access to mobile services at 3.6 GHz to 3.8 GHz

This document represents Ericsson's response to Ofcom's consultation on improving consumer access to mobile services at 3.6 GHz to 3.8 GHz, submitted on 15 December 2016.

Our key points are:

- We fully support Ofcom's plan to make more spectrum in this band available for mobile use, in particular with a view to enabling wide-spread 5G connectivity, which will benefit consumers and enterprises alike
- We would advise to pursue the second policy option, removing fixed links and limiting satellite use. These uses have many spectrum alternatives, while 3.6 to 3.8 GHz is particularly suitable for non-line-of-sight mobile radio technologies
- Beyond the scope of this consultation, we would propose to study the possibility of making the entire band 3.4 to 3.8 (or even up to 4.2) GHz band available for mobile use to enable the multi-gigabit per second speeds that new 5G radio technology will make possible



About Ericsson globally

Ericsson is the driving force behind the Networked Society – a world leader in communications technology and services. Our long-term relationships with every major telecom operator in the world allow people, business and society to fulfil their potential and create a more sustainable future.

Our services, software and infrastructure – especially in mobility, broadband and the cloud – are enabling the telecom industry and other sectors to do better business, increase efficiency, improve the user experience and capture new opportunities.

With customers in 180 countries and approximately 115,000 employees, we combine global scale with technology and services leadership. We support networks that connect more than 2.5 billion subscribers. Forty percent of the world's mobile traffic is carried over Ericsson networks. And our investments in research and development ensure that our solutions – and our customers – stay in front.

Founded in 1876, Ericsson is headquartered in Stockholm, Sweden, and generated revenue of SEK 246.9 billion (around £22 billion) in 2015. Ericsson is listed on the NASDAQ OMX stock exchange in Stockholm and the NASDAQ in New York.

About Ericsson in the UK

Ericsson engages geographically through 10 regional units, one of which is Region Western & Central Europe (RWCE), which includes Germany and the UK and is headquartered in London.

Ericsson is active in the UK since 1898, when we opened our first sales office here. In the early 1900s Britain accounted for ~30% of Ericsson's overall sales. More recently, Sony Ericsson, our mobile handset joint venture with Sony was headquartered in London prior to its sale to Sony in 2012.

Ericsson has made a number of significant investments in the UK, including the acquisitions of Marconi, Technicolor Broadcast Services, Tandberg TV and Red Bee Media (formerly part of the BBC). The UK is the global hub of Ericsson's media business and the majority of media-related R&D, especially video compression development, is done at our site in Southampton.

In February 2016, we launched a research partnership on 5G with King's College in London, in which we address the various technologies required to deliver next-generation communication networks and their implications on consumers and society.

Our main customers in the UK include the mobile operators EE, O2, Vodafone and Three, for which we manage a total of 44,000 radio sites and a number of other network-related services. We are a key supplier to the TV and internet service providers BT, Sky, Virgin Media and TalkTalk, and to the main UK broadcasters BBC, ITV, Channel 4 and Channel 5. We turn over around £500 million p.a. and employ around 4,000 employees in 13 offices across the UK.



Ericsson's responses to Ofcom's questions

Ericsson appreciates the opportunity to comment on the future use of the 3.6 to 3.8 GHz band. As a world leader in developing mobile radio technology, we emphasise that this band is particularly suitable for mobile usage with future 5G radio technologies. It provides a good balance of non-line-of-sight propagation characteristics with a relatively wide contiguous band availability. Both will be important to deliver the ambition of 5G, notably multi-gigabit per second throughput and reliable Internet of Things connectivity.

This consultation is timely, given the recent development regarding 5G spectrum in Europe (RSPG Opinion, EC 5G Action Plan).

Question 1: Do you have any comments on the use of the 3.6 to 3.8 GHz band by existing services?

We concur with Ofcom that the use by existing services is very limited and could be characterised as underutilised and not growing. On the other hand, upcoming 5G technologies require appropriate spectrum, such as between 3 to 4 GHz. Therefore, this is an opportune time to repurpose the spectrum for mobile use.

Question 2: Do you agree with our identification of a trend towards the use of mobile in the 3.6 to 3.8 GHz band?

As does Ofcom, Ericsson notes that the use of mobile data continues to increase rapidly, and expects that mobile data (smart phones, tablets and PC dongles) will increase by a factor of 8 between 2016 and 2022 in Western Europe (Ericsson Mobility Report Nov 2016 <https://www.ericsson.com/mobility-report>).

We see a strong trend towards more intensive use of spectrum in the 3 to 4 GHz range for mobile use due to the propagation characteristics and general availability. The plan to deploy 5G in these frequency ranges is visible not only in Europe, but also in the US, China, South Korea and Japan. Some of these regions also consider to extend the band up to 4.2 GHz. Using similar or the same band plans in the 3 to 4 GHz range will foster a global technology ecosystem of radio equipment and end user devices, which is important for availability and cost efficiency. As is true for other spectrum bands, individual countries should always aim for globally harmonised spectrum bands.



Question 3: Do you agree with our high level proposal to make 116 MHz within the 3.6 to 3.8 GHz band available for mobile and 5G services, bearing in mind our statutory duties and the high level trends we have identified?

We agree with Ofcom's proposal.

We would also propose to further investigate enabling bandwidths of multiple 100 MHz in the longer term. An ideal end-scenario would be contiguous availability over the entire 3.4 to 3.8 GHz or possibly even up to 4.2 GHz (as per Ofcom's work on 3.8 to 4.2 GHz). This would enable "fibre-like" throughput over wireless networks to a wide range of end user devices, including connected cars and on trains, and enable "in-band-backhaul", where fibre to the radio base station is not available.

Question 4: Do you agree with our general approach regarding spectrum currently licensed to UK Broadband?

We agree with Ofcom's approach.

A change to UK Broadband's licence may be required to enable the most efficient and effective use of the 3.6 – 3.8 GHz band. As set out elsewhere in our response, large channel bandwidths will be crucial for future radio technologies and existing spectrum licence holders should be encouraged to support wide and contiguous channels.

Question 5: Do you agree with our assumptions, methodology, and conclusions with regards to potential coexistence between mobile and existing fixed links and satellite earth stations? Please refer to annex 5 for further details.

We consider Ofcom's assumptions, methodology and conclusions regarding co-existence accurate, since these are based on CEPT study parameters and current EC decisions. We note that 5G may have somewhat different characteristics than what is assumed in the existing studies, but we expect that separation distances will be approximately the same. We would suggest that licences in the 3.6 to 3.8 GHz band would include the right to deploy all types of 4G/LTE and 5G radio equipment, including macro base stations with associated height and power output, in all areas of the UK. This may require considerable separation distances to incumbent users. The sharing situation could be improved considerably by using more sophisticated modelling tools and propagation measurements as well as applying different mitigation techniques. Despite such techniques, however, there would still be areas where interference between the systems would be likely to occur, in particular in Greater London and the South-East of England.



Question 6: Do you have a view on any of the two options we identified?

On behalf of the entire mobile industry, our preference would be the second policy option of relocating the existing use.

As Ofcom concludes, there is rather limited use of the spectrum by fixed links and satellite earth stations and both applications have many spectrum alternatives due to the directional nature of the radio links. We would suggest that 6 GHz could be a suitable alternative for fixed links, taking the length of the existing hops into consideration.

Mobile use, in contrast, requires spectrum suitable for non-line-of-sight radio links. 3.6 to 3.8 GHz is such a spectrum band with relatively large bandwidth available and therefore has considerable potential for mobile use.

Full concurrent use by fixed links, satellite earth stations and mobile would most likely significantly reduce the capacity and availability of mobile services to consumers, in particular in the dense areas of Greater London and South-East England.

A compromise could be to continue with the use of fixed and satellite links, under the condition that they provide protection for mobile usage, while mobile would not provide any reciprocal protection to fixed and satellite links, due to the inherently mobile nature of the end user devices.

Question 7: Do you have any quantitative evidence on the costs and benefits associated with the options? This include costs for existing users and/or consumers of existing services associated with potential changes, and benefits to UK consumers in gaining access to mobile services in this band.

It is challenging to quantify the cost and benefits associated with the options set out. Doing so goes beyond our response and would merit a separate economic study. Plum Consulting, however, did already quantify the net benefits of 3.4/3.6-3.8 GHz spectrum in 2015 and estimated the benefit from avoided cost owing to the additional spectrum at EUR 1.4 bn in 2018 NPV terms. It also assesses two further options and their NPV value (see http://www.plumconsulting.co.uk/pdfs/Plum_Jun2015_Use_of_C-Band_for_mobile_broadband_in_Hungary_Italy_Sweden_and_UK.pdf).

Ericsson has also argued in the past that doubling the average speed of broadband can add 0.3 percentage points to GDP growth (see e.g. <https://www.ericsson.com/res/thecompany/docs/corporate-responsibility/2013/socioeconomic-effect-of-broadband-speed.pdf>). Since 5G is expected to increase average mobile broadband speeds to multiple gigabits per second, Ericsson would expect positive implications for GDP (albeit not in a directly linear correlation with speed increases).

In addition, connecting all manner of 'things' to the internet (i.e. IoT) will add further benefits, which would result in indirect benefits to consumers through connected products and services. Examples can be found at <https://www.ericsson.com/5g/use-cases>. We would suggest that an economic study would have to take these indirect benefits into account as well.



Question 8: Do you have any other suggestions that would allow widespread 5G availability using the 3.6 to 3.8 GHz band across the UK while allowing certainty for at least some existing users to continue to provide the benefits currently provided by use of the 3.6 to 3.8 GHz band?

We concur with Ofcom's assessment of mitigation through site shielding, careful deployment of base stations etc. As Ofcom outlines, this may be effective in some, but not all cases, and it may place a considerable burden on some fixed and satellite link licensees. Obviously, relocating or removing earth stations from sensitive areas would be an effective method of avoiding interference in the longer term.

Question 9: Do you have any comments in relation to these proposals?

Rolling out 5G mobile radio networks in 3.6 to 3.8 GHz will require substantial investments, which can only be justified if the licenses will cover a sufficiently long duration (e.g. 20 years or more).

The licenses should also be harmonized with global standards as in the ongoing CEPT work on 3.4 to 3.8 GHz for 5G (ECC PT1).

Network deployments will also be faster and at lower cost, if no additional, country-specific requirements are added to the spectrum licenses.



For further conversations or questions, please contact:

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