



Virgin Media O2 response to Ofcom Call For Input

UK preparations for the World Radiocommunication Conference 2023 (WRC-23):

UK provisional views and positions for WRC-23

September 2022

Contents

INTRODUCTION	2
EXECUTIVE SUMMARY.....	4
MAIN RESPONSE.....	6
Agenda Item 1.2 – including possible identification for IMT, and allocation to mobile, for 6425-7125 MHz (the Upper 6 GHz band)	6
The Importance of 6 GHz for 5G’s future	6
Historical demand for data through UK mobile networks	6
Future demand for mobile data through UK mobile networks.....	7
5G and use cases	9
Extensive and efficient use of existing spectrum	10
Existing mid-band spectrum will be quickly absorbed	10
mmWave spectrum	10
A level of densification is necessary	11
The need for additional mid-band spectrum.....	11
Spectrum for licensed mobile use, and licence-exempt (Wi-Fi) use, are both important.....	13
Agenda Item 1.5 – including possible regulatory actions for 470-694 MHz (the lower UHF band)	14
The lower UHF band can reduce the digital divide and support the widest 5G benefits	14
Consumption of TV is changing and distribution models will need to adapt	15
A move to co-primary creates sovereign flexibility for the UK to respond to changing circumstances.....	16

INTRODUCTION

Virgin Media O2 (“VMO2”) welcomes the opportunity to respond to Ofcom’s call for input on UK preparations for the World Radiocommunication Conference 2023 (WRC-23), UK provisional views and positions for WRC-23¹.

VMO2 has over 43.5 million mobile connections on our network, providing mobile services to a wide range of customers with diverse needs. This includes consumers, business of all sizes including large enterprises spanning a variety of different sectors, utility providers, public sector bodies, emergency service providers, as well as the supply of services to wholesale MVNO customers, and the provision of Internet of Things (“IoT”) and Machine to Machine (“M2M”) capability. Our network covers 99% of the nation’s population with 4G, and more than 600 towns and cities now have 5G services, with rollout continuing at pace, targeting 50% population coverage by the end of 2023.

Our response to this call for input sets out what Ofcom, and indeed Government, should consider when it comes to making key decisions on important spectrum bands. It highlights the need to take appropriate action now, in order to plan accordingly for the future release of additional spectrum, which will be required to support the development of 5G in the UK and ensure the continued availability of high quality mobile services.

Ofcom’s call for input is important and timely. We note that the public consultation on the draft RSPG Opinion on ITU-R World Radiocommunication Conference 2023² was launched in June, and in the same month, The European Commission published its Call For Evidence, World Radiocommunication Conference 2023 – EU position³.

WRC-23 will see key decisions made on the identification and allocation of spectrum bands, which could impact, positively or negatively, on the development of 5G in the UK and affect consumers and businesses for many years to come. We therefore agree with Ofcom that it is important that the UK’s voice is heard at WRC-23, to ensure that the future wireless needs of consumers and businesses are appropriately taken into account in the development of the international frameworks.

We fully recognise the importance of Ofcom’s role to lead the UK delegation at the WRC, and in the preparatory work, and we welcome Ofcom’s intention to liaise closely with Government throughout the preparatory phases and to confirm with Government the positions that it will take into the WRC, to ensure consistency and coherency with UK policy.

In its call for input, Ofcom correctly identifies two key agenda items as being high priority for the UK, these are:

¹ https://www.ofcom.org.uk/data/assets/pdf_file/0025/239407/WRC-23_Call_for_Input.pdf

² https://rspg-spectrum.eu/wp-content/uploads/2022/06/RSPG22-014final-Draft_RSPG_Opinion_WRC23.pdf

³ https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13445-World-Radiocommunication-Conference-2023-EU-position_en

- Agenda item 1.2, which includes potential identification of 6425-7125 MHz (“the upper 6 GHz band”) for International Mobile Telecommunications (“IMT”) and possible allocation to the mobile service on a primary basis. Ofcom identifies that this is being promoted by the mobile industry primarily as a means of enabling additional capacity for 5G in towns and cities; and
- Agenda item 1.5, the review of spectrum use and needs of existing services in the 470-960 MHz band in Region 1 and consideration of possible regulatory actions in 470-694 MHz (“the lower UHF band”) in Region 1, which is currently used by Digital Terrestrial Television (“DTT”). This is cited by Ofcom as one of the highest profile issues being considered at WRC-23.

We welcome Ofcom’s engagement on the crucial preparatory work for WRC-23 and hereby provide our response to the call for input. This is focussed on the two key agenda items highlighted above, concerning vital mid-band, and low-band spectrum, that is of the highest importance to UK Mobile Network Operators (“MNOs”) and the future success of 5G.

EXECUTIVE SUMMARY

It is important that Ofcom takes full account of the well-evidenced, ongoing growth in demand for mobile services provided over public mobile networks, when assessing the likely extent of future demand, and in its preparatory consideration for decisions on the identification and allocation of spectrum for future mobile use.

Mobile data usage, driven by the growing demand for higher quality mobile services, is expected to grow exponentially. This increase has initially been driven by people making greater use of existing 'data hungry' applications and video streaming. Over time, new use cases will develop and be adopted that will give rise to further increases in mobile data usage.

Existing spectrum for mobile use will be quickly absorbed and increased capacity will be required in order to accommodate steep traffic growth and maintain high levels of customer satisfaction. The combination of ongoing growth in demand for data and evolving user needs, means that MNOs, over time, will require additional spectrum across a range of bands, to both improve their connectivity and to ensure that congestion does not degrade the service that they otherwise would be able to deliver.

Even with a multitude of measures and efforts, including extensive deployment of existing spectrum, some further network densification, technology upgrades and spectrum refarming, additional spectrum will be required to cater for the continuing growth in demand. It is our expectation that this growth in demand will continue for the foreseeable future and thus a sufficiently long-term view and action plan is required by Ofcom in respect of spectrum release for mobile use.

Availability of suitable mid-band, and low-band spectrum, in addition to Ofcom's planned release of Millimetre wave ("mmWave") spectrum, will be crucial if MNOs are to successfully meet future demand, deliver the capacity required to maintain high-quality 5G services in key areas, and close the gap between the 5G networks that the UK will expect and the networks it will get.

An absence of additional mid-band spectrum is likely to have a detrimental impact upon UK consumers and businesses, as MNOs would be forced to densify their networks to such an extent to provide the capacity to meet demand, with the cost of doing so being so great it would impact the use of 5G technology and/or need to be recouped by being passed on to customers through an increase in prices. The alternative is that without the required spectrum or very costly densification, operators would have to accept a level of reduction in capacity, resulting in congestion and degradation of service. Both of these scenarios risk stifling the development of 5G in the UK.

Ofcom must commit to preparatory action now, which is required to lay the foundations for future release of suitable mid-band and low-band spectrum for mobile use, and set out a clear path for doing so. Ofcom should carefully analyse the costs and benefits associated with its decisions before taking them, taking full account of the socioeconomic benefits that this spectrum can bring for mobile use and ensure a balanced outcome in respect of the allocation of spectrum between licensed mobile use and licence-exempt use. By doing so, Ofcom will be able to effectively carry out its duty to secure optimal use of spectrum and maximise the economic and social value derived. This will support

investment in high-quality mobile networks and services and facilitate good outcomes, delivering significant benefits for UK consumers and businesses.

We urge Ofcom to take appropriate steps at WRC-23 to support the development of 5G in the UK and ensure that there is sufficient mid-band spectrum available for licensed mobile use in order to meet future demand in urban areas. It must also plan for the future by supporting steps to put the UK on the trajectory of having additional low-band spectrum allocated to mobile, which will be needed in rural areas and will help to reduce the digital divide, whilst retaining its sovereign flexibility to respond to changing circumstances when it is appropriate to do so.

In order to achieve this, we strongly urge Ofcom to:

- Support IMT identification and allocation to the mobile service, for 6425-7125 MHz (the upper 6 GHz band) at WRC-23, in order that it can be made available for licensed mobile use at the appropriate time; and
- Support a co-primary allocation to the mobile service and IMT identification, for 470-694 MHz (the lower UHF band) at WRC-23, in order to provide the flexibility required in the future for the UK to make decisions on its usage at the appropriate time, to enable optimal use.

Failure to plan accordingly, or make the right decisions in preparation for, and at, WRC-23, will not only result in a wasted opportunity, but could result in significant detriment to the development of 5G in the UK, harming the interests of consumers and businesses and limiting economic growth opportunities.

MAIN RESPONSE

Agenda Item 1.2 – including possible identification for IMT, and allocation to mobile, for 6425-7125 MHz (the Upper 6 GHz band)

The Importance of 6 GHz for 5G's future

The upper 6 GHz band is of key importance to the future of 5G in the UK, and indeed many other countries in Europe and across the world. It comprises the largest single remaining block of mid-band spectrum that could be allocated to either licensed mobile, or licence-exempt use, for the foreseeable future.

This mid-band spectrum offers a sweet spot between providing a reasonable level of coverage and good capacity, and so is of particular importance. It is in this band where careful planning, balanced decisions and appropriate timely action is required by Ofcom. The amount of this spectrum that is available to MNOs in the future, will directly influence the extent to which they are able to meet demand and deliver reliable, high quality mobile connectivity.

To highlight this, the GSMA has recently published a body of information on the importance of 6 GHz for 5G's future which we encourage Ofcom to look at. It summarises the situation clearly, as follows:

“For countries that want to maximise the socio-economic benefits delivered by 6 GHz and invest in the future of mobile, deployment of 5G in the upper 6 GHz band is crucial. This will be supported by an IMT identification at WRC-23 and taking these steps will provide the necessary spectrum capacity to secure 5G innovation and growth”.⁴

Availability of sufficient suitable mid-band spectrum for licensed mobile use, in the form of the upper 6 GHz band, will be crucial if MNOs are to successfully meet future demand, deliver the capacity required to maintain high-quality 5G services in key areas, and close the gap between the 5G networks that the UK will expect and the networks it will get.

Historical demand for data through UK mobile networks

It is important that Ofcom takes full account of the well-evidenced, ongoing growth in demand for mobile services provided over public mobile networks, when it is assessing the likely extent of future demand, and in its preparatory work in forming views and positions for forthcoming decisions on the potential identification and allocation of spectrum for mobile use.

When considering the demand for data through the UK's mobile networks, it is informative to look back at previous forecasts, alongside the actual growth in demand and usage. In its 2014 Mobile Data

⁴ <https://www.gsma.com/spectrum/resources/6-ghz-for-5g/>

Strategy Statement⁵ Ofcom stated that the long-term demand for mobile data services is subject to a high degree of uncertainty and there are a wide range of forecasts both in terms of traffic levels and the subsequent implications for future spectrum requirements. At the time, Ofcom said it would therefore continue to develop its view of future growth in mobile data demand, taking account of a range of factors including consumer demand and willingness to pay for mobile data, technology developments (e.g. new devices) that may stimulate demand, and the geographic distribution of traffic and international trends.

In the same statement, Ofcom quoted a forecast which predicted that data carried on mobile networks in the UK, could increase 25 times to 2030, an implied annual rate of growth of 22%.

In the 2016 update to its Mobile Data Strategy⁶ Ofcom acknowledged that actual mobile data traffic had in fact increased eight-fold from 2011 to 2015, with very high annual growth rates, which it said were around 60% per year, recently. Ofcom explained that this exceeded the forecast it quoted in its 2014 Statement.

Ofcom then considered three potential scenarios, which implied an annual growth rate of 25%, 33% and 42%, between 2014 and 2025. It explained that this was an upwards revision to reflect new use cases and the impact they may have on mobile data traffic, as 4G penetration and use increases, and the early adoption of 5G services takes place.

VMO2 believe that it is important to highlight the fact that the highest forecast annual growth rate of the three scenarios considered (42%), almost matches the actual observed average annual growth rate for services provided over public mobile networks (40%) that Ofcom identifies as being observed in most recent years, driven by the development of new applications, and enabled by evolving technologies and changes in consumer behaviour.

To date, the UK's mobile networks have coped well in response to this relentless growth in demand for data. They have risen to the challenge through continued investments in network capacity including spectrum acquisition, network densification and technology upgrades.

Future demand for mobile data through UK mobile networks

In its recent (2022) discussion paper on meeting future demand for mobile data⁷, Ofcom repeats its view that there is a high degree of uncertainty about the future rate of growth, adding this is particularly so when looking beyond 2030. VMO2 agree that estimating the rate of growth beyond 2030 is a difficult task. However, not only is there clear well-evidenced consistent growth in recent years, driven by increased 4G adoption and use of existing services, the progressive rollout of 5G and

⁵ https://www.ofcom.org.uk/data/assets/pdf_file/0027/58347/Mobile-Data-Strategy-statement.pdf

⁶ https://www.ofcom.org.uk/data/assets/pdf_file/0033/79584/update-strategy-mobile-spectrum.pdf

⁷ https://www.ofcom.org.uk/data/assets/pdf_file/0017/232082/mobile-spectrum-demand-discussion-paper.pdf

the corresponding increase in adoption of 5G devices (enabling higher throughput) will see a persistent increase in usage per user when compared to 4G, as is evidenced in other countries.

In addition to this, we expect further usage of existing services, as well as the development and corresponding take-up of new ones. Thus we fully expect to see a continuation of significant growth in demand for mobile data for the foreseeable future.

We anticipate annual traffic growth to persist along the lines that we have experienced on our mobile network in recent years, and within the bounds of Ofcom's most recent forecasts. Growth rates of this magnitude mean that total traffic more than doubles every three years. This is something that is not just evident in the UK, but has also been seen across Europe, as customers demand for mobile connectivity and services remains strong.

Whilst the magnitude of increase over the longer term (beyond 2030) is naturally more uncertain, it is evident that the growth in traffic will continue to be significant, and MNOs will only be able to fully accommodate for such growth and maintain the availability of high-quality services, by investing in network capacity whilst also having access to a sufficient amount of suitable spectrum.

In its discussion paper on meeting future demand for mobile data, Ofcom's consideration of the potential level of future growth, presents an analysis of three scenarios for total mobile data traffic up to 2035, which comprise the following:

- a) Low growth: 25% increase per year to 2030, 20% increase per year from 2030 – 2035
- b) Medium growth: 40% sustained increase per year to 2035
- c) High growth: 55% increase per year to 2030, 60% increase per year from 2030 – 2035

Ofcom explains that these scenarios are not predictions, but instead cover a wide range of possible growth rates, to account for the uncertainty it outlines. Nevertheless, we observe that the medium growth scenario represents a continuation of the 40% year-on-year growth in mobile data traffic use that has been evident in recent years. Furthermore, across all three scenarios envisaged, mobile data traffic is expected to grow many times over.

In addition to the rollout of 5G and the increase in its adoption that will take place, 4G will continue to play a significant role in the delivery of mobile connectivity and capacity across the UK for many years to come, as from a capacity perspective, the UK continues to see strong growth in 4G data demand.

5G and use cases

The role of mobile connectivity as an enabler of our economy and society will only grow over time, and we expect mobile to become even more central and crucial to people's lives. Consumers and businesses will make greater use of mobile services and increasingly rely on mobile connectivity to communicate, access content and to take advantage of an expanding range of use cases. Meeting the evolving needs of customers will require mobile connectivity to be widely available and to provide enough capacity to deliver a high level of quality and reliability.

Consumers and businesses will not want to be constrained in what they can use mobile connectivity for, depending on where they are. Instead, they will expect it to be available anytime, anywhere, to support their needs wherever they go.

Over the coming years, 5G will gradually become the major technology for delivering mobile connectivity and will drive continued strong demand for data. 5G has the capability to offer a step up in many dimensions of mobile network performance, including reliability, speed, and latency. In so doing, it has the potential to enable new use cases which can further evolve with 5G roll-out and network and technology developments.

The progressive increase in 5G rollout in the UK, will facilitate its adoption. In turn, this will result in an uplift in customers data usage, when compared to 4G. We note that in its recent discussion paper on meeting future demand for mobile data, Ofcom observes that when it looked at particularly high growth countries like South Korea, to inform its high growth scenario, it identified that recent mobile data traffic growth has been facilitated by factors such as rapid 5G deployment and take-up, aided by high urban population density and the bundling of data-hungry applications with 5G subscriptions.

We fully expect take-up of 5G, as well as new use cases, to grow over time and this will continue to drive demand for data. An increasing number of use cases will require connectivity that supports very high speeds and low latency. This means that the network used to deliver mobile connectivity must have enough capacity to accommodate for growing traffic levels, and that connectivity must support the use cases and enhanced experience that customers will expect and grow accustomed to.

Increased 5G rollout and adoption of 5G devices (which enable higher throughput) will see a step-change in data usage, when compared to 4G. In addition, over time, new use cases will develop and be adopted that will give rise to a further increase in mobile data demand, with some use cases likely to involve very high data consumption.

The major implication of this trend is its impact on the growth in traffic that mobile networks need to accommodate for, thus not only requiring investment in networks, but critically, it necessitates sufficient suitable spectrum to be made available in order to continue to deliver high quality mobile services and avoid network congestion.

Extensive and efficient use of existing spectrum

VMO2 strongly supports the principle of efficient use of spectrum. As a mobile network operator, we were the first to reuse our 2G spectrum for 3G use, and since then we have extensively refarmed our 2G and 3G spectrum to enhance our 4G capacity to the maximum extent that is feasible, to deliver the greatest efficiency and benefit.

We have always worked very hard to implement innovative solutions to maximise the efficient use of spectrum, including rebalancing different frequencies through refarming and deploying spectrum where it is most needed. We continue to embrace the newest generations of mobile standards, as well as adopting the latest developments in technology and equipment, to extract maximum efficiency and ensure we deliver high quality and reliable mobile services.

In urban areas, where the highest levels of demand exist, all MNOs are increasing capacity through a combination of rapid deployment of existing mid-band spectrum, as well as through a level of increased cell densification.

Despite these concerted efforts, over the next few years, existing spectrum will become rapidly exhausted by the continuous growth in demand for mobile data, fuelled by increased adoption of 5G and greater usage of existing services, as well as newly developed ones. In addition to a level of densification, in the medium term (between 2025 and 2030), MNOs will require additional spectrum to meet demand if they are to avoid significant congestion in key areas.

Existing mid-band spectrum will be quickly absorbed

MNOs are currently focused on deploying 5G networks across the UK using a mix of low-band and mid-band spectrum. For the next 3-5 years, these deployments should be sufficient to meet fast-growing market demand for speed and capacity. During this time, we expect that demand for 5G capacity can be almost entirely met through the roll-out of existing bands, in particular the 3.4-3.8 GHz band.

However, beyond that period (between 2025 and 2030) existing mid-band spectrum will be quickly absorbed by demand, which, as we have highlighted above, is well-evidenced. MNOs therefore face a future challenge in respect of their ability to meet demand, especially in dense urban areas. As a result, before the end of the decade, additional mid-band spectrum will be required if they are to continue to provide high quality 5G services, prevent networks from going into congestion, and avoid a deteriorating impact on customers in key areas, such as the largest cities and towns across the UK.

mmWave spectrum

The highest quality 5G requires delivery using mid-band spectrum, due to the available bandwidth and channel sizes. In addition, and over time, mmWave spectrum is also expected to play a role in helping to meet demand. However, its deployment is expected to be localised in specific busy areas or

'hotspots' which see the very highest levels of demand, and individual mmWave cell deployment will typically cover an area no larger than a few street blocks, owing to the propagation characteristics of the spectrum.

Whilst mmWave spectrum can support greater speed and capacity, its deployment is likely to be challenging for a number of reasons. Careful planning is required to avoid interference issues with other deployments and its limited propagation means that deployment at a single site delivers connectivity to a much smaller area.

Achieving similar coverage as mid-band spectrum would require deployment from more sites than is economically or practically feasible for MNOs to deliver, as densification and small cell deployment is expensive and specific inter-site distance considerations create new planning challenges, in addition to existing ones.

A level of densification is necessary

In its recent discussion paper on the subject, Ofcom identifies that meeting future demand for mobile data will require some degree of densification. We agree. Going forward, further network densification will be necessary, and this will be the case in all traffic growth scenarios. Certainly, densification is a key part of providing reliable high-speed mobile services using 4G as well as 5G, something that customers will expect now, and in the future.

However, densification on its own will not be the solution. Significant network densification, absent more mid-band spectrum being assigned for mobile, will be impractical, expensive and unsustainable for an industry with marginal Return on Capital Employed ("ROCE"). A balance is therefore required between a viable amount of densification and incremental mid-band spectrum, to be released for mobile use at the right time, in order to achieve an economically efficient, as well as environmentally friendly way of addressing the issue.

It is important that Ofcom fully considers and understands the significant practical and economic challenges that are involved, when examining the potential scale of network densification that is likely to take place in the UK. It must reflect upon this when determining the amount of spectrum that is to be made available in the future for mobile use, and which will be essential to deliver the capacity required to meet growth in demand.

The need for additional mid-band spectrum

In light of the multiple challenges involved with densification at scale, the ability to deploy more mid-band spectrum from individual sites will allow MNOs to most efficiently cater for future demand and continue to deliver high quality mobile services.

A recent study by Coleago Consulting⁸ confirmed the need for additional mid-band spectrum and quantified the issue based on analysis of long-term 5G mid-band spectrum needs. It concluded that:

“Additional mid-band spectrum would enable the 5G NR experienced 100/50 Mbit/s data rate to be delivered in an economically feasible manner in the cities we examined, anytime, anywhere, citywide thus delivering not only the 5G experience for smartphone users but also enabling the smart city”.

Without access to additional mid-band spectrum, MNOs will not be able to economically deliver the 5G-NR requirement and associated quality of service. This would mean that the connectivity they can deliver would also not support the full suite of 5G use cases. For instance, it means that initiatives such as Smart City needs, which empower consumers and businesses to reduce emissions, cannot progress towards their potential.

Coleago concluded that additional mid-band spectrum is needed for mobile operators to deliver high-quality mobile connectivity across urban and suburban areas. Making the upper 6 GHz band available for mobile use is a crucial part of enabling MNOs to meet the growing levels of demand for data in the medium and longer term. It will mean that higher quality 5G services can be provided across urban areas and avoid congestion in key areas such as large cities and towns across the UK.

The counterfactual is that an absence of additional mid-band spectrum is likely to have a detrimental impact upon UK consumers and businesses, as MNOs would be forced to densify their networks to such an extent to provide the capacity to meet demand, with the cost of doing so being so great it would impact the use of 5G technology and/or need to be recouped by being passed on to customers through an increase in prices.

The alternative is that without the required spectrum (or very costly densification) operators would have to accept a level of reduction in capacity. Thus will mean congestion and degradation of service, impacting customers and result in a missed opportunity for the UK to deliver the full potential of 5G.

In its discussion paper on meeting future demand for mobile data, Ofcom correctly identifies that making additional spectrum available for high-power outdoor mobile use would likely require clearing bands of existing users. Given the significant amount of time it is expected to take to clear and repurpose such spectrum (which Ofcom believe will be around 6-8 years), it is critical that Ofcom commences the required preparatory process now, to start the groundwork and lay the foundations for release in the future. This includes preparations for WRC-23 and having a clear UK Government position on support for an IMT identification for the upper 6 GHz band.

Designation to the IMT system is the most effective way to ensure that a band can be used on a large scale for delivery of mobile services. It ensures that the required ecosystem develops and is at a scale that supports efficiency and innovation. The GSMA has recently published updated information on the 6 GHz IMT Ecosystem⁹.

⁸ <https://www.coleago.com/app/uploads/2021/09/Estimating-Mid-Band-Spectrum-Needs.pdf>

⁹ <https://www.gsma.com/spectrum/wp-content/uploads/2022/08/6-GHz-IMT-Ecosystem.pdf>

Spectrum for licensed mobile use, and licence-exempt (Wi-Fi) use, are both important

In 2020, Ofcom allocated 500 MHz of spectrum in the lower 6 GHz band, to licence-exempt use, including Wi-Fi. This almost doubled the amount of spectrum available for such use, adding to existing 2.4 GHz and 5 GHz spectrum, and with a large amount of spectrum also available between 57-71 GHz, capable of supporting very high capacity and demands, there is no shortage of spectrum for Wi-Fi. This is positive in respect of ensuring that millions of fixed broadband customers will continue to benefit from gigabit broadband connectivity, such as that provided by VMO2, through the use of Wi-Fi.

However, given there is no shortage of spectrum for such use, further identifying the upper 6 GHz band for licence-exempt use would represent a clearly unbalanced approach and would be a mistake when taking into consideration the scarcity of, and requirement for, additional mid-band spectrum for mobile use. We are concerned that IMT identification for the upper 6 GHz band could be stalled by a push for it to be identified for licence-exempt use. This would, at best, significantly delay the timeline at which it can become available for mobile use, but could also result in serious impact to the mobile connectivity that UK operators can deliver over the medium and longer term and limit the benefits that the spectrum can deliver.

To highlight this, the GSMA's study on The socio-economic benefits of the 6 GHz band¹⁰, found that allocation of the full 6 GHz band for licence-exempt use would not be the most beneficial option in any of the study's considered scenarios. Instead, allocating the upper 6 GHz band for mobile use, when the lower 6 GHz band is allocated for licence-exempt use (as in the UK), would deliver the greatest socio-economic benefits, even with extremely high-speed fixed broadband availability.

We encourage Ofcom to take a holistic approach when assessing and making decisions on the upper 6 GHz band. This should include carrying out a proper analysis of costs, benefits, and risks, of potential uses, with an analytical perspective applied over a sufficiently long period of time. This approach is key to ensuring that Ofcom secures the optimal use of the spectrum and delivers the greatest value for the UK.

Given the evidence, we strongly urge Ofcom to support an IMT identification and allocation to the mobile service for the upper 6 GHz band, and ensure that it makes UK Government's position clear on this as part of its preparations for WRC-23. This is critical for a mobile ecosystem to develop for this band, which is a requirement for it being used to deploy mobile services. This will be a fundamental part of creating the right conditions to encourage greater investment in 5G and deliver the level of ambition that the country will expect in terms of the availability of high-quality mobile services.

¹⁰ <https://data.gsmaintelligence.com/api-web/v2/research-file-download?id=72941571&file=160622-The-socioeconomic-benefits-of-the-6-GHz-band.pdf>

Agenda Item 1.5 – including possible regulatory actions for 470-694 MHz (the lower UHF band)

The lower UHF band can reduce the digital divide and support the widest 5G benefits

The combination of ongoing growth in demand for data and evolving user needs, means that MNOs, over time, will require additional spectrum across a range of bands to both improve their connectivity and to ensure that congestion does not degrade the service that they otherwise would be able to deliver.

As we have outlined in our response to Ofcom’s recent discussion paper on meeting future demand for mobile data¹¹, in the future, mobile connectivity delivered using 5G will be widely available, but it will typically not be of the highest quality in rural areas. Deploying mid-band spectrum in these areas is not economically viable due to the very high costs it would entail to densify the network sufficiently for the spectrum to be effective. The only feasible way for mobile operators to improve the connectivity they deliver in these areas, is by deploying additional low-band spectrum. The strong propagation of this spectrum means that it can be deployed from fewer (i.e. existing) sites, whilst still achieving good coverage. This makes it an efficient and cost-effective way to expand 5G coverage and improve quality, and the greater the amount of such spectrum that operators deploy, the greater the speed and capacity available to users in these areas.

A recent publication by GSMA, Use of the UHF Band in Europe: A new look at an old debate¹² highlights the following:

“The lower UHF band offers good propagation properties and the possibility to efficiently re-use existing sites for providing mobile broadband service. Additional UHF spectrum would allow improved performance of IMT networks in areas where higher frequencies have less effective propagation characteristics, such as over wide rural, suburban areas and in buildings. For populations in rural areas especially it would improve digital inclusion, enable remote working, education and access to essential services and help with targets for equal digital opportunities, including healthcare and education. It would also contribute to delivering the higher speed seamless internet needed by travellers on roads or rail networks.”

GSMA also highlights that:

“It is important to note that the network enhancements that support such societal benefits would not be viable without additional low band spectrum. Densification or use of higher bands to achieve the same outcome is, in rural areas and other challenging environments, hugely unprofitable or materially impossible. The relevant question is therefore not how much would be saved in deployment costs

¹¹ VMO2 response to Ofcom discussion paper, Mobile networks and spectrum: Meeting future demand for mobile data, April 2022

¹² <https://www.gsma.com/gsmaeurope/wp-content/uploads/2022/07/GSMA-Europe-sub-700-MHz-position-paper.pdf>

compared to a scenario that is not realistic, but rather how much would end users benefit from the increase in QoS brought about by the possibility to install additional carriers in existing sites.”

Furthermore, whilst opportunities to refarm existing low-band spectrum may exist in the future, they will be limited, and any such spectrum will be quickly absorbed as demand increases and 5G adoption continues. This will leave a capacity problem in rural areas.

Making additional low-band spectrum available in the future, in the form of the lower UHF band, will help to address this problem and reduce the quality divide between rural and urban areas, helping to ‘level-up’ the services available across the UK. This spectrum can also be deployed across a wide range of areas in order to provide even greater coverage and better indoor performance, whilst adding additional 5G capacity.

A recent study by Plum Consulting¹³ also examined the current and future use of the lower UHF band, considering both mobile demand and broadcast viewing habits, and challenged whether allocation of this spectrum should be changed. In relation to rural areas, the report states that:

“...the economics of networks ensure that operators find it challenging to justify further investment...This threatens to open a new type of digital divide, where those in urban areas are able to access services that rural inhabitants are excluded from”.

The report also states:

“...The only way to provide these high-quality services in deep rural areas is through greater use of sub-1 GHz UHF spectrum, which will provide network operators with the ability to dedicate further bandwidth on existing site infrastructure to 5G or future mobile technologies. This will not only benefit deep rural areas through the availability of new technologies – although the benefits in those areas are very large by themselves – but it will also benefit those on transport routes and the development of connected vehicles. It will help with economic wellbeing and with societal targets of inclusion and equality...”.

It is evident that, in the coming years, more spectrum will be needed to meet increasing traffic and user needs in these areas. Making spectrum in the lower UHF band available for mobile use, at the appropriate time, will be the only feasible solution to this challenge, which will become more pressing over time.

Consumption of TV is changing and distribution models will need to adapt

The lower UHF band spectrum is currently used to deliver Digital Terrestrial Television (DTT), yet the value and efficiency of this mode of providing television will decrease over the coming years. Whilst DTT provided using the lower UHF band remains a valuable service for many in the UK today, traditional linear TV consumption is reducing. On-demand content consumption has grown rapidly

¹³ <https://plumconsulting.co.uk/the-future-use-of-uhf-in-itu-region-1/>

and continues to do so. These trends are well-evidenced and are highlighted most recently in Ofcom's Media Nations: UK 2022 Report¹⁴.

This shifting landscape means that other methods of distribution that exist are likely to become a more cost-effective and efficient way to deliver such services, as well as provide enhanced functionality which is increasingly attractive to consumers. As Ofcom highlights in its Media Nations Report, the UK has already seen announcements from the BBC of proposals for some broadcast content to be moved to on-demand delivery within three years and a corresponding reduction in its linear channels¹⁵.

We also note that the Government has recently published a broadcasting white paper which included a proposal to ask Ofcom to continue to track changes to DTT viewing and to undertake an early review on market changes that may affect the future of content distribution before the end of 2025.

Given the significant trends and in the face of a rapidly changing environment, the current users of this spectrum (i.e. the public service broadcasters and multiplex licensees) may themselves see a need to adapt accordingly and potentially change distribution models, therefore flexibility in this area is of key importance.

If the existing users wish to vacate the band ahead of the 2034 licence expiry, driven by changes in funding models and a substantial shift in TV consumption patterns (to IP and application delivery) we believe that Ofcom should be agile and move to close down DTT, before licence expiry, if desired by the public service broadcasters. Ofcom can then expedite releasing this spectrum for mobile use and ensure its optimal use.

A move to co-primary creates sovereign flexibility for the UK to respond to changing circumstances

In the meantime, Ofcom should support a co-primary designation to mobile for the lower UHF band at WRC-23, as a first step. A move to co-primary designation for mobile will assist with developing the ecosystem ready for standardisation. This will put the UK and other countries on the trajectory of this spectrum being assigned to mobile when it is appropriate to do so. Once released for mobile use, this spectrum can then be used by MNOs to increase capacity and improve the quality of 5G connectivity they can deliver in rural areas and thus help to close what will be a significant and growing quality divide.

We note that at 5.1.9 of the call for input, Ofcom's states that:

"...we recognise that others will likely argue for greater flexibility through the addition of a mobile allocation and possibly IMT identification in the band. Ofcom will listen carefully to such arguments and will need to consider whether any such proposals for greater flexibility can be accommodated in a way that does not significantly undermine the viability of the DTT platform in the UK. Our priority will

¹⁴ https://www.ofcom.org.uk/data/assets/pdf_file/0016/242701/media-nations-report-2022.pdf

¹⁵ BBC announcement on CBBC and BBC Four, May 2022

be to ensure that, following the outcome of WRC-23, DTT services can continue to operate in the 470-694 MHz and that any decision on the future use of this band in the UK rests with the UK authorities.”

VMO2 observes that a move to co-primary allocation, and IMT identification, will not change the UK's level of control over the use of the band for broadcasting. Future use of the band remains a decision for the UK. A national decision at the authorisation level is required to effectively change the use of the band and continued use for DTT would be compliant with the Radio Regulations. As a result, there is no recourse through the ITU to force a change of use in the UK. The decision rests with UK authorities and the UK is free to do what it wants for broadcasting within its existing Geneva 2006 agreement.

Any move to mobile would require co-ordination with geographic neighbour countries. Therefore co-primary allocation creates sovereign flexibility without impacting upon existing users or prejudging outcomes. It will enable the UK, should it wish to do so in the future, to adapt and respond to changing circumstances within the existing construct of agreements with neighbouring authorities. The UK would be able to respond to these changing circumstances, outside the procedural constraints of ITU agreements and the timeframe for mobile use of the band remains within the UK's control.

The GSMA highlights this key point in its recent publication on Use of the UHF band in Europe, as follows:

“...action at WRC-23 is a necessary step to keep options open without undermining legal certainty for existing users, or for Member States that wish to make use of the conditioned national flexibility granted by the UHF Decision.”

GSMA also highlights the importance of a decision being taken on a co-primary allocation to mobile at WRC-23 and not waiting until WRC-27:

“...planning for scenarios beyond 2030 is crucial. A co-primary allocation to the mobile service at WRC-23, together with the clarity to preserve until 2030 the rights enshrined in the UHF Decision, would provide a roadmap for investors, mobile operators, EU countries and EU neighbours. The GSMA supports such a primary mobile allocation, allowing for the development of options to explore the use of the band or parts thereof for 5G and 6G by those Region 1 countries that wish to do so. Without stating a priority of one service over another, it would give EU Institutions and EU Member States sufficient time to set the right long-term co-existence framework, and it would allow Europe to keep all options open for its decision. The alternative of waiting until WRC-27 to take a decision would not leave sufficient time to prepare the technical harmonisation for new uses or carry out new assignment processes ready for 2030. This process has taken several years with other bands. For example, the 700 MHz band co-primary allocation was initially agreed at WRC-12 and finalised in WRC-15, but the band was not made available and assigned in many EU countries until 2021.”

In conclusion, we urge Ofcom to support a co-primary allocation to mobile and IMT identification for 470-694 MHz (the lower UHF band) at WRC-23. Ofcom must take appropriate actions now, to support the future growth of 5G in the UK and to ensure that mobile network operators not only have sufficient capacity to continue to meet growing demand and provide high quality services in urban areas, but are also able to meet the expectations and demands of users in rural areas, thus helping to deliver the widest set of benefits to consumers and businesses across the UK and reduce the digital divide.