TELEFÓNICA UK LIMITED RESPONSE TO:

Ofcom's Consultation

"Supporting the UK's wireless future:
Our spectrum management strategy for the 2020s"

I. INTRODUCTION

1. Telefónica UK Limited ("Telefónica") welcomes the opportunity to respond to Ofcom's consultation on Supporting the UK's wireless future: our spectrum management strategy for the 2020s[1].

2. We welcome the fact that Ofcom is taking a strategic approach to spectrum management and it recognises the importance of looking at the medium and longer term, in addition to consideration of short term and immediate priorities.

3. Regardless of the timeline involved, it remains important that Ofcom acts as an evidence-based Regulator and is able to demonstrate this in the decisions and actions that it takes in relation to spectrum. Telefónica believes this is especially important in relation to Ofcom's duties to have regard to the demand for use of spectrum and in making spectrum available.

4. We agree with Ofcom that spectrum is a vital national resource. Ofcom's ability to effectively carry out its duty to secure its optimal use, is key to delivering significant benefits for UK consumers and businesses and maximising the economic and social value derived from spectrum.

5. We broadly agree with Ofcom's overall approach to the review and the trends that it has identified that could be relevant over the next ten years. We support Ofcom's stated approach to continue to largely rely on market mechanisms where possible, but use regulatory levers where necessary. For example, we support Ofcom using its powers to clear existing spectrum bands and repurpose them in the event that a more efficient use is identified which will deliver greater value. We agree with Ofcom that its existing tools and approach is likely to be sufficient to adapt to future developments and achieve its objectives in most cases.

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[1]https://www.ofcom.org.uk/__data/assets/pdf_file/0027/208773/spectrum-strategy-consultation.pdf

6. We look forward to Ofcom setting out a plan which contains details of the actual steps and actions it intends to take in the areas it has identified as being a priority to deliver its vision for the future use of spectrum. This should include, where at all possible, timelines for each step and action in order to provide clarity and certainty. It should also include a clear assessment of any costs and benefits to ensure that actions are proportionate and meet the desired objective of securing optimal use of spectrum and that spectrum is used in a way that maximises the benefits that consumers and businesses derive from it.

II. GENERAL COMMENTS

The importance of consistent regulation and promoting investment

7. Telefónica strongly supports a stable long-term regulatory environment that encourages competition and incentivises and supports investment. Ofcom should generally allow market forces to work properly and intervene only where necessary to address competition concerns or market failures. This is important to avoid the potential for distortion of markets and competition.

8. Is it absolutely vital that Ofcom has regard to the desirability of encouraging investment when making decisions on spectrum matters. Promoting investment is a priority for Government and should be a priority for Ofcom. The regulatory regime managed by Ofcom, including its management of spectrum must support and incentivise continued investment and the rollout of mobile services to keep pace with the rising consumer and business demand and ensure that the UK is a leader in 5G.

9. Ofcom should remain alert to the risk of making decisions or taking actions that could undermine the substantial economic investments that have already been made, or that could disincentivise or weaken future investment cases.

10. Telefónica is investing more than ever in its network to improve coverage and capacity and deliver the best experience for all our customers across the UK. We continue to invest in our rollout and upgrading our network. We have made significant spectrum investments to support our network and services, most recently, our parent company Telefónica, invested £523m in new spectrum for 4G and 5G services.

11. We continue to roll out 5G at pace and have recently reached 160 towns and cities with our 5G network and are committed to boosting rural connectivity to serve customers and businesses in hard to reach areas. We played a leading role in the Shared Rural Network initiative which will build and share 222 new mobile masts to boost rural coverage across the UK and meet our stated targets set with the Government. Our investment in national 5G infrastructure will contribute towards the billions of pounds that 5G is expected to add to the UK economy each year as it is rolled out.

12. When setting its spectrum management strategy, Ofcom must not underestimate the importance of the provision and maintenance of a stable and predictable regulatory environment which minimises uncertainty and promotes such substantial investment.

The Government's Statement of Strategic Priorities

13. Telefónica strongly supports The Government's ambition that the UK should be a global leader in 5G to take early advantage of its potential and help to create a world-leading digital economy that works for everyone, with high quality coverage where people live, work and travel. Telefónica will play a key part in helping to achieve this ambition though our investment in 5G.

14. A major component of realising this ambition hinges upon being able to build and deploy our network and services in the locations and times that we need to, without barriers. This is vital in order to provide next generation services that are accessible to consumers and also to businesses of all sizes to help fuel future innovation that will boost the economy.

15. The Government has stated that a future-focused spectrum policy is required to help ensure that spectrum is allocated in a way that supports the Government's mobile ambitions.

16. The Government recognises that successful rollout of 5G will require significant levels of commercial investment and it has stated it is taking an active, facilitating role to help create the best conditions for the private sector to invest in developing and deploying 5G in the UK in a timely and efficient manner. Put simply, better connectivity and services requires investment. Ofcom should focus its strategy on helping to support long term investment in line with the Government's strategic priority in that respect.

17. Ofcom should formulate its spectrum management strategy with the government's strategic direction in mind, as well as Ofcom's own statutory duties. We note that Ofcom identifies its requirement to have regard to the UK Government's Statement of Strategic Priorities in its consultation. Those priorities include the Government's clear ambition for the UK to become a world leader in 5G and we welcome the fact that Ofcom has made clear its support for this and look forward to seeing the specific actions that it will be taking to play its part in realising that ambition.

5G, innovation and the future

18. 5G brings many exciting and transformative possibilities for businesses large and small, across every industry sector. In technical terms, 5G represents a significant step forward from 4G, on which it will initially build. As it evolves, 5G will bring major new innovative technological capabilities that will support entirely new business models, sectors, and more efficient ways of working.

19. Innovation is a central part of Telefónica's business and culture. We are a founding member of the 5G Innovation Centre (5GIC) at the University of Surrey and as a wider company group, we are actively playing a key role in the development of 5G technologies, contributing to relevant international projects, industry associations and standardisation bodies. For example, Telefónica founded 5TONIC, an open research and innovation laboratory focusing on 5G technologies.

20. A key part of Ofcom's vision for enabling even greater benefits from use of spectrum is support for further innovation in wireless technologies and applications. This aligns with Government's strategic priority to help create the conditions for a competitive mobile market that supports investment and innovation in 5G.

21. One of the priorities set out to achieve this, is the Government's 5G Testbeds and Trials Programme which was designed to encourage trials involving different user types with different requirements, addressing deployment and technological challenges, and helping to create a 5G ecosystem in the UK.

22. Telefónica is actively involved in this initiative and is partnering with several of the trials and testbeds. We are working in consortia with industry specialists to respond to the Government's initiative and to enable us to develop and trial new 5G technologies and services across multiple industries and geographical locations, including in remote communities. This will help to deliver greater benefits and provide enhanced consumer and business experiences using 5G.

23. In addition, we are engaged in a number of other trials and initiatives where we are working directly with a number of businesses across a wide range of sectors and services including construction, manufacturing, retail, transport, utility and entertainment, to explore how they can make the best and innovative use of 5G.

24. We are also partnering with businesses in a number of sectors including defence and utilities, to help develop 5G Private Networks which will help improve connectivity, productivity and security. We firmly believe 5G will continue to bring major new innovative technological capabilities that will support entirely new business models, sectors and deliver more efficient ways of working.

25. As we open up our 5G innovation spaces across the UK, this provides 5G test environments to fuel this ongoing innovation. It is our belief that 5G can't be regarded as just improved connectivity, but it can change the way business operates and open up new ways for them to serve customers and for people to work, delivering real value to the economy through innovation.

26. 5G also introduces the new possibility of network slicing across our network. This will enable businesses to create virtual networks, with dedicated bandwidths and ultra-low latency. This will be critical for use cases such as emergency services communications as well as for connected sensors in autonomous cars.

27. Telefónica is fully committed to playing its part in supporting wireless innovation and will continue to be engaged in trials and partnerships to explore how mobile technology and areas such as IoT, AI, AR, and data analytics, can be used to deliver smart solutions to improve key verticals, all delivered by using mobile spectrum in a highly efficient way that maximises value.

Optimal use of spectrum

28. Telefónica strongly supports the efficient use of spectrum. We have worked hard to implement innovative solutions to maximise the efficient use of our spectrum holdings, such as rebalancing different frequencies through refarming. We were the first operator to reuse our 2G spectrum on the 3G network and have extensively refarmed our 2G and 3G spectrum to enhance our 4G capacity to better meet consumer and business needs. We also deployed our 2.3GHz spectrum immediately by switching on sites and using the spectrum within 24 hours of obtaining the rights to do so from Ofcom. We have demonstrated that through embracing the new evolutions of mobile technologies such as 5G, we can achieve even more efficiency compared to earlier generations of network technology.

29. We have invested in utilising technology such as Massive MIMO by deploying more antennas on our masts and developing small cell technologies to deliver greatly increased 4G capacity and provide new 5G services. We have also invested in self-optimsing network technology to improve efficiency through automated load-balancing, where customers are automatically moved between our networks. In addition, we have invested heavily in transportation hubs by installing bespoke 4G and 5G indoor solutions into airports, train stations and venues around the country to provide greater coverage and capacity and truly maximise the efficient use of spectrum.

30. We strongly support the Government's objective of ensuring the efficient use of spectrum, including preventing underutilisation of spectrum. Ofcom's duty to secure the optimal use of spectrum should clearly be an inherent part of its spectrum management strategy. We agree with Ofcom that 'optimal use' should mean that spectrum is used in a way that maximises the benefits that people and businesses derive from it, including the wider social value of spectrum use.

31. We support the Government's expectation that Ofcom should report on the utilisation of spectrum and as such, we support Ofcom's initiative to provide greater information in this respect. This should be done by Ofcom in a proportionate manner and assessed to ensure that it actually delivers benefit.

32. Ofcom should ensure that it has sufficient protections in place to guard against practices such as the warehousing of spectrum, or opportunistic exploitation of spectrum which does not result in an efficient use, nor create any wider economic or social value.

33. We believe that Ofcom should give careful consideration to the potential re-purposing and/or release of spectrum bands that are underutilised and which could be used more efficiently to deliver greater value.

Release of spectrum for mobile use

34. Telefónica is supportive of appropriate actions, such as the timely release of spectrum, where it promotes long term investment and facilitates services such as 5G and new innovative services which deliver economic and social value and benefits for consumer and businesses.

35. Whilst we appreciate that Ofcom's spectrum management strategy is positioned as primarily setting out _how_ Ofcom intends to manage spectrum, we think there is a

need and benefit, in Ofcom providing greater clarity on _what_ it intends to do, including the timings for spectrum release.

36. Even with the multitude of measures and efforts that we have undertaken to maximise our efficient use of spectrum, additional spectrum will be clearly be required to cater for the continued, evidenced growth in demand for mobile services as the bandwidth per user increases and new applications and services are launched. It is our expectation that this trend will continue for the foreseeable future and thus a sufficiently long term view and plan is needed by Ofcom in respect of spectrum release for mobile.

37. In its 5G strategy for the UK, The Government stated that 5G's requirement to use wider spectrum bands that previous generations of mobile technology should be taken into account in order to achieve the expected performance in terms of speed, capacity and latency. The 26GHz band is one of the pioneer bands for 5G services which Government has stated its support for. We encourage Ofcom to set out its plan for release of this band, including timescales and options for release mechanisms and licensing. Failure to do so could mean the UK will be left lagging behind other countries who have already successfully enabled the band for 5G use. We believe that Ofcom should consider new innovative approaches to licensing in this band, such as a Club Licensing mechanism, which has the potential to facilitate flexible usage through sharing and maximise the efficient use of the spectrum.

38. The Government has also stated that it regards the release of additional public sector spectrum as a strategic priority. Ofcom has worked with Government to promote the efficient use of spectrum by the public sector which has seen the release of the upper 2.3GHz band and the 3.4GHz band. However, Telefónica believes that there is more to be done in this area. For example, opening up the lower 2.3GHz band, which was identified as a high priority band for Public Sector Spectrum Release. This band should be enabled for mobile use as it is already supported by mobile networks and handsets. We would be grateful if Ofcom could provide clarity on the status of work on this band.

39. We also encourage Ofcom to provide an update on the 1.4GHz band in terms of spectrum at 1427-1452MHz. This was also identified as a high priority for Public Sector Spectrum Release and could also be used for mobile services, given the technical harmonisation of the band and the existing 1452-1492MHz is already allocated and used for mobile services in the UK. We understand that feasibility studies were carried out, but we are not clear what further work has been undertaken to move forward with release and so request that Ofcom also provides clarity on the status of this.

40. We also believe that the 3.8-4.2GHz band has strong potential for mobile use and we encourage Ofcom to closely follow any developments on this outside the UK and that it supports allocation for mobile use.

Spectrum sharing

41. Telefónica believes that spectrum sharing should be used as a complimentary tool to meet actual demand. Mechanisms should not simply be implemented which provide theoretical efficiency, they should be implemented to facilitate meeting demand and result in the delivery of tangible benefits and value which would not have otherwise be realised.

42. Telefónica sees spectrum sharing as essentially a 'two-way street'. Access should not be focussed just on mobile bands, but equally apply to other bands. We see no reason why a sharing policy should be unidirectional, it should be multidirectional. The most important factor in spectrum sharing is that the incumbent rights are respected and interference is avoided, for example, through appropriate protection mechanisms and/or commercial agreements.

43. Ofcom should incentivise existing licence holders to facilitate spectrum sharing through ensuring there are no barriers to commercial agreements and that incumbents are suitably able to compensate for costs incurred in facilitating and providing access.

44. Ofcom must ensure that any spectrum sharing in mobile bands does not undermine the rights and flexibility of mobile operators to deploy services in the places and at the times they need to, in order to meet continued growing demand. Failure to do so could delay the rollout mobile services, including 5G.

Taking a leading International role

45. We support Ofcom's proposal to continue to take a leading International role in spectrum matters as this aligns with one of the Government's strategic priorities. We encourage Ofcom to continue with its International engagement that it devotes effective resource to ensuring that the UK influences the agenda and seeks to achieve co-ordination and harmonisation of spectrum, something that is key to maximising efficiencies and delivering benefits as widely as possible. We are keen to understand further details on how Ofcom intends to ensure it continues to take a leading role, given the fact that the UK has now left the EU and Ofcom no longer

attends the RSPG, in which it led its spectrum strategy group and it no longer represents the UK in the RSC.

46. The remainder of this document provides responses to Ofcom's specific consultation questions. However, we wish to draw Ofcom's attention to the fact that many of the views and points that we have provided thus far in the above sections, are directly relevant to the themes and topics that form the specific consultation questions and so should be taken to form part of our response to the specific questions.

III. RESPONSES TO SPECIFIC QUESTIONS

Question 1: Do you have comments on the overall approach to the review?

47. We broadly agree with Ofcom's overall approach to the review. We support Ofcom's stated approach - to continue to largely rely on market mechanisms where possible, but use regulatory levers where necessary. For example, we support Ofcom using its existing powers to clear spectrum bands and repurpose them in the event that a more efficient use can be made which delivers greater value. We also agree with Ofcom that its existing tools and approach is likely to be sufficient to adapt to future developments and achieve its objectives in most cases.

Question 2: Have we captured the major trends that are likely to impact spectrum management over the next ten years?

48. We believe that Ofcom has broadly identified the major trends that *could* impact spectrum management over the next ten years.

Question 3: Could any of the future technologies we have identified in Annex 6, or any others, have disruptive implications for how spectrum is managed in the future? When might those implications emerge?

49. Ofcom should monitor the development of future technologies and assess their impact. Some technologies clearly have the ability to create benefits and indeed do so today, for example AI and Self-Optimising Networks, which Telefónica has already enabled in it's network.

50. Automated spectrum management tools could have a role to play in the future to deliver more efficient use of spectrum through sharing. However, such tools and

systems require skills and expertise and need to be proven as secure and stable before being deployed. It is important that any costs which arise as a result of their introduction are carefully assessed and controlled to avoid acting as a disincentive or barrier. Before introducing sophisticated complex tools that could be costly, Ofcom should first let the market decide if they are necessary, or whether simple, low-cost basic mechanisms might be more desirable, which can be evolved and advanced over time, if required.

51. We agree that the development of 6G will require additional spectrum bands (in the same way as 5G will) and is likely to have a greater focus on higher frequencies.

Question 4: Do you agree that there is likely to be greater demand for local access to spectrum in the future? Do you agree with our proposal to consider further options for localised spectrum access when authorising new access to spectrum?

52. At present, we think it is unclear if there is likely to be greater general demand for local access to spectrum in the future. Ofcom should monitor demand and report regularly on the uptake and utilisation of any local access in spectrum bands where it is enabled, in order to establish the extent to which spectrum sharing policies and any arising actions are increasing the utilisation of spectrum and delivering optimal use. This should take into account the cost of administration and any other burdens placed on incumbent spectrum users.

53. There may be greater demand in specific bands that is created as a result of a more distinct utilisation trend in that band. For example, in the 26GHz band, future usage for mobile services may be mainly concentrated in areas of high demand, leaving relatively large geographic areas where opportunistic local access would make sense and be an efficient use of the spectrum, where it is not otherwise being used.

Question 5: Do you agree with the actual and perceived barriers identified for innovation in new wireless technologies, and our proposed ways of tackling those?

54. In general, we do not see significant barriers for innovation in new wireless technologies.

Question 6: Do you agree with Ofcom's proposals to improve our outreach and reporting activities, and spectrum information tools?

55. We support such proposals on the basis that they are done in a proportionate manner and are subsequently demonstrated to deliver benefits.

> *Question 7: Do you agree that it is important to make more spectrum available for innovation before its long-term use is certain? Do you have any comments about our proposed approach to doing this?*

56. We support Ofcom in making spectrum available for innovation such as the innovation and trial licences that it currently makes available to support 5G research and development. However, decisions about making spectrum available more generally, beyond innovation and trial licences, should be evidenced to ensure it is proportionate and is done to meet actual demand.

> *Question 8: Do you agree that it is important to encourage spectrum users to be 'good neighbours' to ensure more efficient use of the spectrum? Do you agree with our proposals to:*
> *a) increase realism in coexistence analysis at a national and international level?*
> *b) encourage spectrum users to be more resilient to interference?*
> *c) ensure an efficient balance between the level of interference protection given to one service and the flexibility for others to transmit?*

57. We agree that increased realism in coexistence can be beneficial and deliver a more efficient use of spectrum. Such measures should not just be considered in the context of shared spectrum, but also be applied to other areas of spectrum. For example, when setting out technical conditions for licensed spectrum, instead of using actual equipment performance specification, there has been a tendency to rely on technical assumptions and the use conservative models. This has led to some unnecessarily stringent technical conditions limiting efficient use of the spectrum. In addition we believe that a more realistic approach should be taken to restrictions in the 2.3GHz band in order to achieve greater efficiencies.

58. We believe that more could be done to foster a regime to improve receiver performance. There appears to have been little action or progress in this area over the last few years in the UK. Better performing receivers can reduce the need for restrictions, for example in the 900MHz and 3.4GHz band, which can improve spectrum usage and efficiency.

> *Question 9: Are there any other issues or potential future challenges that should be considered as part of this strategy?*

59. As we have highlighted, Ofcom should monitor demand for mobile services and ensure that it is well prepared to release additional spectrum to cater for increasing demand and enable the continued development of 5G. This will support long term

investment, deliver a high level of economic and social value and ensure that the highest quality services are provided to consumers and businesses alike.

> *Question 10: Do you agree that continued use of our existing spectrum management tools (as set out in sections 4-7) will be relevant and important for promoting our objectives in the future, in light of future trends?*

60. We agree that Ofcom's existing tools and approach is likely to be sufficient to adapt to future developments and achieve its objectives in most cases.

> *Question 11: Is there anything else we should be considering doing, or doing differently, to promote our objectives?*

61. Ofcom should monitor demand and provide clear reports on actual shared and local access usage of spectrum bands. Spectrum bands that are underutilised should be cleared and re-purposed for use that delivers greater efficiency and value.

62. Telefónica believes that more needs to be done in the area of Public Sector Spectrum Release in order to achieve the most efficient use of this spectrum. For example, the lower 2.3GHz band should be opened up for mobile use on a nationwide basis.