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Your response

Question	Your response
Question 3c: What is your view on the use of 6425-7025 & 7025-7125 MHz, and what evidence do you have to support this view? How does that inform your views on a IMT identification in these bands?	See attached for response.

Response of Cisco Systems, Inc. to Ofcom's Consultation Document

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

UK Provisional Views and Positions for WRC-23

29 September 2022

This response contains no confidential information.

Introduction

Cisco Systems, Inc. (Cisco) is a San Jose, California, U.S.A. based company that is the leading provider of IP-based networking technologies in the world. Cisco has a significant UK presence, with sales, services and research and development staff, servicing thousands of enterprise customers and partners. Additionally, Cisco has made significant investments in various UK Government (DCMS) 5G projects over the past few years. Cisco is also the leading vendor of enterprise-grade Wi-Fi in the world.

Cisco appreciates the opportunity to comment on Ofcom's consultation seeking input on the agency's positions before the World Radiocommunication Conference in late 2023.[1] WRC-23 represents an important opportunity to advance the UK's connectivity goals consistent with the country's "Levelling-Up" strategy.[2] While a supporter of a technology neutral approach to connectivity infrastructure and a combination of technologies such as 5G and WiFi6E, Cisco respectfully urges Ofcom to adopt a position of "no change" regarding WRC-23 Agenda Item 1.2, which asks whether to identify the 6.425-7.025 and 7.025-7.125 MHz bands (together, the upper 6 GHz band) for International Mobile Telecommunications (IMT). Given the spectrum already available for IMT and the technical characteristics of the upper 6 GHz band, identification of the band for IMT would be unnecessary, costly, and of questionable benefit for UK consumers and businesses, as well as running counter to the UK's sustainability goals.

Question 3c: *What is your view on the use of 6425-7025 & 7025-7125 MHz, and what evidence do you have to support this view? How does that inform your views on a IMT identification in these bands?*

<u>The fibre-Wi-Fi combination is critical to future UK connectivity needs</u>

The COVID-19 pandemic has demonstrated that reliable high-speed broadband connectivity is essential to people's ability to work, learn, and stay connected with their communities. The UK has responded with its "Project Gigabit" and "Levelling Up" strategies, which will invest at least £5 billion to provide gigabit-capable broadband to at least 85 percent of the UK by 2025.[3] Progress has been strong. In 2020, full fibre broadband was available to over 5 million UK

[1] Ofcom, "UK Preparations for the World Radiocommunication Conference 2023 (WRC-23): UK Provisional Views and Positions for WRC-23," (June 24, 2022) ("Consultation), *available at* https://www.ofcom.org.uk/consultations-and-statements/category-1/call-for-input-uk-preparations-for-wrc23.

[2] Secretary of State for Levelling Up, Housing and Communities, "Leveling Up the United Kingdom" (2 February 2022) (Levelling Up White Paper), *available at* https://www.gov.uk/government/publications/levelling-up-the-united-kingdom.

[3] *See id.* at xvii.

homes (18 percent of the country), a rise of 80 percent from 2019.[4] This year, 70 percent of the country now has access to gigabit connectivity, with fibre-to-the-premise networks reaching 40 percent of UK premises, and an additional 30 percent covered by gigabit-capable cable broadband service (DOCSIS 3.1).[5] These fibre and cable networks provide the fastest and most reliable broadband connections and are adopted by more than half of European households with such access.[6]

Exploiting the capabilities of high-speed connectivity to the premises necessarily demands high-speed connectivity within the premises, which means Wi-Fi for the overwhelming majority of end users. Over 90 percent of European data usage takes place indoors, and Wi-Fi ensures that billions of connected devices make the most of their broadband service. 92 percent of European broadband traffic is relayed via Wi-Fi – not cellular service -- once it enters a building.[7] Even IMT relies heavily on Wi-Fi, with nearly 80 percent of mobile device traffic offloaded on Wi-Fi.[8]

The UK's widespread adoption of fibre and other advanced technologies will substantially increase the amount of traffic traveling across Wi-Fi connections within homes and businesses. Wi-Fi traffic doubles every 3 years, and the existing 2.4 GHz and 5 GHz Wi-Fi bands are quickly becoming congested, limiting the ability of UK citizens to connect in a reliable manner and have a smooth experience.[9] Technological progress and consumer demand inevitably lead to new devices and use cases requiring even better speed and latency, making Wi-Fi throughout the 6 GHz band necessary to complement high-speed connections to homes and businesses.

By contrast, while Cisco fully supports the UK's goal of nationwide 4G nationwide coverage and 5G coverage to a majority of the population by 2030, reports from service providers and

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[4] "Ramping up the Rollout of Full-Fibre Broadband," Ofcom (March 2021), *available at* https://www.ofcom.org.uk/about-ofcom/latest/media/media-releases/2021/rollout-full-fibre-broadband.

[5] *See* "Nothing Changes, if Nothing Changes: the UK's Full Fibre Rollout Cannot Rely Solely on the Central Government," Total Telecom (Sept. 15, 2022), *available at* https://totaltele.com/nothing-changes-if-nothing-changes-the-uks-full-fibre-rollout-cannot-rely-solely-on-central-government/; "Four Out of Ten Premises Passed by a Full Fibre Network in the UK," ThinkBroadband (September 1, 2022), *available at* https://www.thinkbroadband.com/news/9284-four-out-of-ten-premises-passed-by-a-full-fibre-network-in-the-uk.

[6] Ferdinand Nijboer and Jan Frederik Slijkerman, ING, "Telecom Outlook: Fibre roll-out to Reach 60% of European Households in 2022," (Jan. 28, 2022), *available at* https://think.ing.com/articles/fibre-roll-out-to-reach-60-of-european-households-2022.

[7] Dynamic Spectrum Alliance, "How Do Europeans Connect to the internet" (2022) (How Do Europeans Connect to the internet), *available at* http://dynamicspectrumalliance.org/wp-content/uploads/2022/06/DSA-WhitePaper-How-do-Europeans-connect-to-the-Internet.pdf.

[8] Martha Suarez, "6 GHz Band's Golden Opportunity for Unlicensed Access and Wi-Fi 6," ISE Magazine (April 20, 2020), *available at* https://www.isemag.com/5g-6g-and-fixed-wireless-access-mobile-evolution/article/14267403/progression-and-potential.

[9] Dynamic Spectrum Alliance, "Lessons from the Assia Report on 'Wi-Fi and Broadband Data'" (October 2021), *available at* http://dynamicspectrumalliance.org/wp-content/uploads/2021/11/Lessons-from-the-Assia-Report-on-Wi-Fi-and-Broadband-Data.pdf.

multiple European regulators confirm that mobile networks carry only a small fraction of internet traffic.[10] Studies show that Europe has a strong preference for fixed broadband and a lower adoption of 5G compared to other regions. Despite being available to 62 percent of the population, the uptake of 5G in Europe accounts for only 2.8 percent of its total mobile connections, compared to 13.4 percent in the United States and 29.3 percent in South Korea[11] -- countries that have prioritized the upper 6 GHz band for fibre/Wi-Fi over additional 5G capacity.

An IMT identification of the 6 GHz Band Is unnecessary

Rather than adding the upper 6 GHz band to the already large amount of spectrum allocated – but not yet fully used – by IMT, Cisco asks the UK to focus its efforts on expanding the capabilities of Wi-Fi, the service most widely adopted by its citizens. Technological progress and consumer demand inevitably lead to new devices and use cases demanding even better speed and latency, making fibre paired with Wi-Fi throughout the 6 GHz band necessary to the UK's goal of "driv[ing] growth and productivity across the UK and widen job opportunities through remote working."[12]

Cisco agrees with Ofcom's recent statement in its recommendation to CEPT on Agenda Item 1.2: "[u]se of mmWave and densification of networks, including deploying mmWave on small cells, have a significant potential for increasing capacity – greater than simply adding further spectrum in the bands 6425-7025 MHz and 7025-7125 MHz to existing site grids."[13]

In the last few years, IMT interests have significantly increased their spectrum demands[14] even as Wi-Fi spectrum relays more than 90 percent of wireless traffic. Cisco does not suggest that MNOs should only be allocated spectrum proportionate to their delivered capacity. But we encourage regulators to ensure that IMT spectrum demands are supported by the identification of real business cases in which outdoor coverage cannot be achieved via densification and millimetre wave spectrum.[15] Where the need for additional IMT spectrum is justified,

[10] How Do Europeans Connect to the internet at 9-11.

[11] European Telecommunications Network Operators' Association, "State of Digital Communications 2022" (February 2022), *available at* https://www.etno.eu/downloads/reports/state_of_digi_2022.pdf.

[12] Levelling Up White Paper at 183.

[13] Ofcom Recommendation on WRC-23 Agenda item 1.2: 6425-7025 MHz and 7025-7125 MHz, Electronic Communications Committee, CEPT (rel. Sept. 20, 2022) ("Ofcom CEPT Recommendation"), *available at* https://cept.org/Documents/ecc-pt1/72989/ecc-pt1-22-210_uk_wrc-23-agenda-item-12-6425-7025-mhz-and-7025-7125-mhz.

[14] *Compare* GSMA, "The Importance of 6 GHz for 5G's Future" (Aug. 1, 2022), *available at* https://www.gsma.com/spectrum/resources/6-ghz-for-5g/ with GSMA, "GSMA: 5G at Risk if Mobile Operators Don't Get Access to the Right Spectrum" (November 5, 2018), *available at* https://www.gsma.com/newsroom/press-release/gsma-5g-at-risk-if-mobile-operators-dont-get-access-to-the-right-spectrum/.

[15] *See, e.g.,* Consultation at 18 ("existing mobile spectrum holdings and spectrum already planned for release are likely to be broadly sufficient to meet future demand to 2030, if MNOs pursue a number of strategies including network densification.").

regulators should then analyse the impact of any spectrum allocation on functionality at the edge of the fibre footprint before making any further decisions.

Moreover, although we acknowledge that 5G delivers important and innovative solutions, IMT capacity has been predominantly used in Europe for the distribution of video streaming content like YouTube.[16] With respect to the upper 6 GHz band, Cisco respectfully suggests that Ofcom prioritise fibre/Wi-Fi networks that can serve consumers, factories and hospitals at the same time, while at the same time encouraging technological solutions that increase efficient use of existing spectrum for critical outdoor services, make better use of shared spectrum for non-critical workloads, and improve the ability for customers to offload video steaming services to Wi-Fi whenever possible.

Making the upper 6 GHz band available for Wi-Fi would be more affordable, accelerate digital transformation, and support the UK's sustainability goals

Even if the upper 6 GHz band is identified for IMT use, any operations in the band would be difficult and costly to achieve. According to one study, "the UK's licence data shows that Upper 6 GHz is still in use by the oil industry (including Norwegian entities) in UK waters of the North Sea, as well as the UK energy utilities, MNOs, police, coastguard, water industry and broadcasting (unidirectional feeder links) with approximately 500 active unidirectional and bi-directional links (the majority) published in their open licence data between 6.5 and 7.1 GHz."[17] Accommodating such a large number of fixed links would likely significantly delay any IMT use of the upper 6 GHz band, as Ofcom recently stated:

> Making these bands available for high-power outdoor mobile use will likely require clearing them of existing users such as fixed links, making it unlikely that the band could be used for IMT until towards the end of the decade (by which time the mobile operators are likely to have needed to implement other approaches to deal with traffic growth).[18]

Moreover, the separation distances necessary to protect each of these fixed service (FS) operations from interference caused by IMT operations in the band could be significant, further undermining the utility of any potential IMT operations in the band. A recent study of IMT-FS coexistence in Germany[19] found that separation distances of as much as 200 km may be

[16] Cam Cullen, Sandvine, "YouTube Accounts for 35% of Worldwide Mobile internet traffic, Sandvine Says," (Feb. 28, 2019), *available at* https://www.sandvine.com/inthenews/youtube-accounts-for-35-percent-of-worldwide-mobile-internet-traffic.

[17] *See* LS Telecom *et al.*, "Socio-Economic Benefits of IMT Versus RLAN in the 6425-7125 MHz band in Europe" at 13 (June 7, 2022) (LS Telecom Study), *available at* http://dynamicspectrumalliance.org/wp-content/uploads/2022/06/DSA-Report-6425-7125-MHz-EU-Study.pdf.

[18] Ofcom CEPT Recommendation.

[19] Federal Republic of Germany, "Sharing Study for WRC-23 Agenda Item 1.2 on IMT/GS in 6 425-7 125 MHz," Document 5D/1273-E, ITU-R WP5D Meeting Documents (June 7, 2022) ("The worst-case simulation shows the necessary separation distances to protect the FS from interference can exceed 200 km. If the BS [base station]

necessary in that country, which would require cross-border coordination and dramatically limit potential IMT deployments.

Another challenge with allocating the upper 6 GHz band for IMT is how to address the fixed satellite service (FSS) operations in the band. As one study states, "[s]haring with the [FSS] uplink makes it very difficult for wide-area networks to operate in the band as the EIRP and antenna patterns required would inevitably present a source of aggregated interference to space-borne receivers[20] Ofcom's CEPT recommendation also flags this concern, concluding "[o]ur initial view is that sharing [between IMT and FSS] may not be feasible although our analysis is still on-going."[21] Moving FSS operations out of the band, however, could be costly and take years to complete.[22] Even after the FSS relocations are complete, 5G deployments in the upper 6 GHz band would require even greater expenditures. The same study estimates that 5G in the upper 6 GHz throughout the CEPT countries could cost 73 billion EUR – a massive expense that might necessitate government assistance at the expense of other digital transition priorities.[23]

By contrast, multiple countries have found that Wi-Fi operations already authorized in the lower 6 GHz band can be permitted in the remainder of the band under similar circumstances without causing interference to either FSS or FS operations. Following extensive coexistence studies, these administrations have determined that, with appropriate lower power levels, indoor Wi-Fi operations at lower power can be extended throughout the 6 GHz band, while higher power operations can be conducted in portions of the band under the control of an Automated Frequency Coordination system. Through these regulatory mechanisms, there is no need to reframe or reallocate incumbent users.

The lack of an IMT ecosystem would likely further delay service in the band. As the consultation notes, "the agenda item for the band 6425-7025 MHz is for Region 1 only, thereby limiting potential economies of scale, and [we] are aware that a number of countries around the world have made the band available for WAS/RLANs."[24]

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antenna is positioned inside the clutter (below rooftop) the necessary separation distances remain above 60 km. The results highlight that co-channel sharing between FS and IMT could become challenging in the 6 GHz band."). *See also* Federal Republic of Germany, "Working Document on Sharing and Compatibility Studies of IMT Systems in the Frequency Band 6 425-7 125 MHz, Document 5D/1198-E, ITU-R WP5D Meeting Documents (June 3, 2022) (concluding separation distances of 40km would be necessary to protect FS sites throughout Europe).

[20] LS Telecom Study at 11 (citing RR-20 APAC "Outcome on Key Issues for the Satellite Industry @ WRC-19 Agenda", ESOA, Oct 2020, *available at* https://www.itu.int/en/ITU-R/seminars/rrs/2020-Asia-Pacific/Forum/Session%208_WRC-19%20and%2023/ESOA_Session%208%20_WRC19%20Outcome%20and%20Key%20AI%20WRC23_BP.pdf).

[21] Ofcom CEPT Recommendation at 2.

[22] *Id.* at 8

[23] *Id.* at 7.

[24] Consultation at 18.

Instead, nations around the world – including many UK allies and some of the largest economies in their regions -- are deploying RLAN – not IMT – throughout the 6 GHz band.[25] Manufacturers have responded with a robust Wi-Fi ecosystem using the entire 6 GHz band and will ship more than 350 million Wi-Fi6E devices just this year. Among the larger economies, however, only China and Russia are seriously considering using this spectrum for IMT. Countries following their lead will have to wait for hardware manufacturers to devote the substantial financial resources to produce an IMT ecosystem for the band, which could take years. While the upper 6 GHz band lays fallow waiting for IMT service, citizens of other leading economies will receive the full benefits of RLAN throughout the 6 GHz band.

Finally, Ofcom should consider whether an IMT identification of the upper 6 GHz band is consistent with the UK's sustainability goals. To achieve the UK's legally binding target of Net Zero emissions by 2050, all industrial sectors, including communications, must improve their energy efficiency.[26] Such efficiency gains must come first from mobile networks, which according to a recent ARCEP study, consume 70 percent of the energy in a communications access network.[27] IMT operations in the upper 6 GHz band may require even higher power levels to reach inside buildings because of the physical characteristics that are particular to the band. To overcome the signal loss associated with double-paned windows, service providers using the upper 6 GHz band will likely need to operate at higher power levels to obtain the same indoor coverage as lower mid-band spectrum. Administrations considering identifying the upper 6 GHz band for IMT should carefully study the impact on energy usage, and by extension, climate change, that would result from using the upper 6 GHz band for outdoor to indoor coverage.

Conclusion

The UK's digital transformation will rely on a combination of technologies such as 5G, private 5G, Wi-Fi, fibre, satellites and other technologies. Cisco thanks Ofcom for the opportunity to comment on the UK's potential positions going into WRC-23, and respectfully urges the agency to oppose attempts to identify the 6.425-7.025 and 7.025-7.125 MHz bands for IMT, considering the need to expand Wi-Fi capabilities in the UK and the technical characteristics of the upper part of the 6GHz band.

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[25] *Id.* ("Licence-exempt use is a credible alternative use for this band: North America and a number of countries in other regions have licence exempted the band for use such as Wi-Fi and 5 G NR-U. This would take advantage of the nascent ecosystem of devices serving significant indoor traffic earlier than could be achieved by IMT.").

[26] *See, e.g.*, HM Government, "Net Zero Strategy: Build Back Greener" at 78 (October 2021) (targeting industry sector carbon emissions for 63-78% reduction by 2035 from 1990 levels), *available at* https://www.gov.uk/government/publications/net-zero-strategy.

[27] ARCEP, "Achieving Digital Sustainability" at 11 (December 2020), *available at* https://en.arcep.fr/uploads/tx_gspublication/achieving-digital-sustainability-report-dec2020.pdf.