



Microsoft Response to the Draft RSPG Work Programme for 2018 and beyond

Microsoft offers a comprehensive set of computing devices and cloud services which often rely on wireless connectivity to be functional and accessible. As such, our devices, services, and customers are spectrum users, and Microsoft has an important stake and keen interest in spectrum management policies.

As cloud-based services become increasingly central to our day-to-day lives, the need for robust, ubiquitous, and affordable broadband connectivity becomes all the more critical. And while Internet access is the norm for many people, significant gaps still exist, particularly in rural and remote areas of Europe.

The Radio Spectrum Policy Group of course plays an important role in this area by providing strategic advice relating to the use of radio spectrum in the context of electronic communications and the information society. Microsoft therefore appreciates the opportunity to provide views on the RSPG's draft Work Programme for 2018 and beyond. Specifically, we offer views on the items on **5G Implementation Challenges** (page 6 of the Work Programme) and **European Spectrum Strategy** (page 9).

- **5G implementation challenges**

This RSPG work item will include the finalisation of a Second Opinion on 5G networks, on which the RSPG is seeking views in parallel to consulting on this Work Programme. Microsoft strongly endorses the RSPG's view in that Opinion that *"general authorised frequency use can be an important breeding ground for innovation and contributes towards a dynamic market environment"* and we warmly welcome the declaration that *"the application of a general authorisation regime is foreseen in the 66-71 GHz band which could be an important band for 5G"*.

Microsoft applauds the RSPG for taking a holistic approach that takes into consideration multiple bands and multiple authorization options. We agree that Europe's 5G spectrum strategy should enable 5G capabilities using a diverse set of radio access technologies that can be deployed by a wide variety of stakeholders.

Although the majority of attention of 5G development has focused on the exciting advances in IMT technology that makes use of traditional cellular spectrum licences, Microsoft believes that the majority of devices that will meet the 5G requirements will make use of licence-exempt, lightly-licensed, and shared licence spectrum, and more attention needs to be given to this area.

The grand success of the existing Wi-Fi ecosystem can be attributed to the globally harmonized licence-exempt bands at 2.4 GHz and 5 GHz and a set of globally interoperable 802.11x standards. With major and influential markets leading the way, we envision the same kind of success in the 66-71 GHz frequency band which is capable of extremely high throughput in 10s of gigabit per second.

Some of the ways in which 5G mobile communications will be differentiated from previous generations of mobile services are by its significantly higher data rates of above 1 Gbps and lower latency rates of around 1 ms. The mmWave bands are expected to play a key role in future 5G services as they can accommodate the high capacity requirements through its larger channel sizes.

Providing for licence-exempt use in the 60 GHz band will enable additional mobile data off-loading in dense urban and indoor environments, enable an increase in the number of simultaneous high-bandwidth users, and create enough capacity to support new use cases that may require very high throughputs. These very high-speed / low-latency applications may include wireless docking; 4K video streaming; next generation gaming; 'wireless fibre' connections inside data centres or between an optical fibre strung along a utility pole and one or more structures; multiple users of augmented reality devices in relative proximity on factory floors, in warehouses and retail spaces; and mobile robots that utilise machine vision and telemetry as inputs to cloud-based artificial intelligence.

All of these applications will benefit from the IEEE 802.11ay¹ standard under development, which builds upon the current IEEE 802.11ad-2012² (WiGig³) standard for Wide Local Area Networks operating in the 60 GHz band. The updated standard will allow up to four, 2.16 GHz-wide channels to be bonded to achieve transmission rates in the 10s of gigabits per second. The amended standard will also allow for licence-exempt operations at greater range.

Applying a general authorisation scheme to the 66-71 GHz band, as foreseen by the RPSG, would see Europe join the United States⁴ and potentially Canada,⁵ and Australia⁶ in authorising licence-exempt access within the 60 GHz band, providing a solid foundation for global harmonisation, accelerated standards development and valuable scale for the emerging equipment ecosystem.

- **European spectrum strategy**

Technology is changing rapidly — and nowhere is that more evident than in wireless communications. Our ability to harness spectrum for broadband has advanced exponentially over the past decade, but access to spectrum often remains hindered by a regulatory model first developed over a century ago and optimized around exclusive use licences protected by swaths of unused spectrum as a buffer from potential interference. Although this model is appropriate for some services, today's technologies allow for sharing of spectrum, resulting in greater reuse of spectrum at lower costs and improving access for all.

Microsoft commends the RPSG for making space in its Work Programme to ponder longer-term spectrum management and develop a strategic vision and we look to the RSPG to include spectrum sharing and ways to balance licensed and licence-exempt approaches in its deliberations. We note that "RSPG-led high-level workshops" are included among the planned deliverables and hope that these will allow for the contributions of stakeholders, including Microsoft.

¹ IEEE Task Group ay - Standard for Information technology--Telecommunications and information exchange between systems Local and metropolitan area networks--Specific requirements Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications-- Amendment: Enhanced throughput for operation in licence-exempt bands above 45 GHz.

² IEEE Standard for Information Technology – Telecommunications and Information Exchange Between Systems – Local and Metropolitan Area Networks – Specific Requirements – Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications – Amendment 3: Enhancements for Very High Throughput in the 60 GHz Band, December 2012.

³ WiGig is a registered trademark of the Wi-Fi Alliance

⁴ FCC (2017) FCC Rules Title 47 https://www.ecfr.gov/cgi-bin/text-idx?SID=e5cb4993fd6188a7d4213e79734fc294&mc=true&node=se47.1.15_1255&rgn=div8

⁵ Innovation, Science and Economic Development Canada (2017) Consultation on Releasing Millimetre Wave Spectrum to Support 5G, <https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11298.html>

⁶ The ACMA consultation on Variations to the LIPD Class Licence, <https://www.acma.gov.au/theACMA/variations-to-the-lipd-class-licence-2>

In general, Microsoft believes that **spectrum sharing** is crucial for meeting the ever-increasing demands for spectrum and for making spectrum more abundant, more efficient, and more affordable in the coming decades. This should include application of dynamic sharing approaches that increase the amount of spectrum which can be used at any given place and time and which, using databases and the cloud, can enable spectrum managers to monitor and dynamically control the availability of spectrum.

Microsoft has been following and contributing to the legislative debate over the proposed European Electronic Communications Code (EECC), which is obviously an important topic for the RSPG, as outlined on page 3 of the draft Work Programme. Important elements of the changes which are expected to be included in the Code are the increased prominence it will give to spectrum sharing as a tool for making more efficient use of spectrum while protecting incumbents, while empowering and encouraging spectrum managers to make more use of sharing. The Code is also expected to make it easier for spectrum managers to reallocate under-utilised spectrum, a “**use-it-or-lose-it**” principle.

For these reasons, it is both welcome and sensible that the RSPG has included sharing in the topics it plans to cover in its European Spectrum Strategy work, and we also recommend that the RSPG expand this to explore the role of use-it-or-lose-it or use-it-or-share-it approaches in order to make more efficient use of spectrum.

Microsoft advocates spectrum policies that **balance licensed and licence-exempt approaches**, which will maximize innovation and investment. We recognize co-existence and the needs of other parties using spectrum on a licenced basis. At the same time, bands currently authorized for licence-exempt access have proven a remarkable success, now accounting for the majority of innovation in wireless communications, the majority of wireless devices manufactured, and the majority of Internet traffic carried to consumers - more than half of the world’s data traffic is carried via licence-exempt Wi-Fi. Numerous other applications ranging from microwave ovens to industrial control and inventory systems similarly rely on licence-exempt spectrum. These uses will continue to grow with the continued evolution of the Internet of Things and robotics. It is therefore important to ensure that allocations of spectrum for licence-exempt and shared use keep appropriate pace with that allocated to licensed operators – as the ecosystem continues to grow, both types of spectrum should grow in a balanced way.

As exemplified by Wi-Fi, the licence-exempt / general authorisation-based ecosystems spur competition by lowering barriers to entry, allowing a larger number of participants individually to make smaller investments, and introducing new products and services quickly and affordably. Numerous studies have shown that opening a portion of spectrum for licence-exempt access can bring about greater economic value in terms of consumer surplus.⁷ A vibrant Wi-Fi ecosystem is a great example of such economic value and Wi-Fi has become a major on-ramp to the Internet for a majority of the population worldwide. Licence-exempt spectrum is also expected to play a major role in connecting the Internet of Things (IoT) for smart city applications.

⁷ Telecom Advisory Services, LLC (2014) Assessment of the Economic Value of Unlicensed Spectrum in the United States, <https://pdfs.semanticscholar.org/5d81/ff994b7cbc9ccc0d067f1e102b0409755bbb.pdf>