

**Before
INNOVATION, SCIENCE AND ECONOMIC DEVELOPMENT CANADA
Ottawa, ON K1A 0H5**

In the Matter of)	
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Consultation on the Releasing Millimetre Wave Spectrum to Support 5G)	Canada Gazette, Part I July 15, 2017 Notice No. SLPB-004-17

COMMENTS OF NOKIA

Nokia respectfully submits Comments in response to the above-captioned Consultation from Innovation, Science and Economic Development Canada (“ISED”) on Releasing Millimetre Wave Spectrum to Support 5G.

I. NOKIA’S 5G VISION (RESPONSE TO QUESTION 4-1)

Nokia is an innovation powerhouse, offering unparalleled leadership in the technologies that connect people and things. Nokia is leveraging its strengths to create a new type of network that is intelligent, efficient, and secure, and which will serve as a critical enabler of many capabilities and use cases associated with the Internet of Things (IoT). We are weaving together the networks, data, and device technologies to create the universal fabric of our connected lives. In this new paradigm, new applications and data will flow without constraint, services and industry will automate and run seamlessly, and communities and businesses can rely on privacy, security, and near instant response times by connecting through the cloud. The role of analytics and data science in this world will be a significant contributor to the design of new infrastructure and services supporting the network and creating value to fuel investment and innovation.

Nokia brings together, in one company, mobile broadband with fixed line access, and the underlying IP routing and optical technology that connects them. Nokia has made pioneering advancements in reducing the footprint of mobile base station infrastructure, from compact yet full power macro sites down to the full range of small cell solutions, which are expected to be critical to enabling 5G deployment and the IoT. Nokia also offers the industry's most comprehensive portfolio of services for integrating heterogeneous networks ("HetNets"), encompassing analysis, optimization, deployment, and management. With approximately 40,000 employees focused exclusively on research and development ("R&D"), Nokia is well placed to play a leading role in shaping the new revolution in connectivity.

To address Question 4-1, we attach to these comments a White Paper, "5th generation (5G) of communication networks a key enabler of the Internet of Things (IoT)." The White Paper describes the new generation of capabilities – such as self-driving cars, healthcare and fitness "wearable" technologies, and the capability to control their home environment while on the move – which are placing increasing demands on existing networks, and the policy enablers regulators should consider to make the promise of 5G a reality.

Among the recommendations in the White Paper, Nokia highlights the needs for robust protections for intellectual property that will be generated to enable 5G. Canada should maintain a fair and balanced intellectual property rights framework that rewards investment in research and development. Additionally, significant efforts should be made to allocate additional spectrum, not only in the millimetre wave bands, but also in low-band (below 3 GHz) and mid-band (3-24 GHz) spectrum ranges. This diversity of spectrum ranges is essential to addressing the diversity of use cases and geographies that will be supported by 5G.

Policymakers should also consider policy enablers to support network densification that 5G demands. These dense networks will be deployed as heterogeneous networks, combining macro sites with smaller base stations and using a range of radio access technologies including LTE-A, Wi-Fi and any future 5G technologies. The need to densify network infrastructure deployments that involve the location of potentially hundreds of thousands of new small cells and related technologies will increase pressure on local governments to review applications for siting. ISED should consider a national policy framework of best practices that local governments can adopt to speed consideration of siting applications and the ultimate availability of 5G.

II. NOKIA SUPPORTS DEVELOPMENT OF SERVICE RULES FOR FLEXIBLE USE OF THE 28 GHZ, 37-40 GHZ, AND 64-71 GHZ BANDS WITHOUT DELAY (RESPONSE TO QUESTION 5-1)

The Consultation identifies three spectrum bands that Nokia agrees show great promise for the next generation of wireless: (1) 28 GHz; (2) 37-40 GHz; and (3) 64-71 GHz. Nokia appreciates that ISED is making these recommendations in advance of World Radio Conference of 2019 (WRC-19) and before 5G standards are finalized. We agree that ISED's approach will promote innovation and early adoption of 5G technology, and Nokia supports moving forward at this time to unlock the promise of these bands.

III. 28 GHZ FREQUENCY BAND (QUESTIONS 6-1 TO 6-4)

(Question 6-1.) Nokia agrees with ISED's proposed changes to its frequency allocations and policies to introduce flexible use licensing in the 28 GHz Band. (Question 6-2.) Given that there have been no licenses issued under the current licensing framework for the 28 GHz band, Nokia agrees with ISED's proposal to place a moratorium on issuing new site-specific fixed licenses, based on the current lack of fixed terrestrial services provided in this band. (Question

6-3.) Nokia recommends that ISED adopt a band plan aligned with the United States, with two blocks of 425 MHz each. Such alignment will facilitate equipment harmonization and simplify coordination along the border.

(Question 6-4.) Based on a study provided by Nokia and others,¹ the U.S. Federal Communications Commission (FCC) concluded that that harmful aggregate interference is unlikely to occur from the mobile operations to satellite operations.² In addition, the satellite industry has not shown that it has a legal right to protection from aggregate interference during the proceeding in U.S.

Nokia believes that a power flux density (PFD) limit threshold can be used as a trigger for an FSS earth station to coordinate with terrestrial earth stations. Nokia proposed a threshold of -77.6 dBm/m2/MHz at 10 meters above ground level which was adopted by the FCC for the U.S.,³ and the same threshold should be adopted for Canada. Nokia also conducted measurements that showed that mitigation techniques such as shielding may be needed around FSS earth stations in order to meet the PFD limit when the FSS earth stations are deployed in close proximity to the 5G systems.⁴

¹ Letter from Verizon, AT&T, Nokia, Ericsson, Samsung, and T-Mobile to FCC, GN Docket No. 14-177 and IB Docket No. 15-256,” May 6, 2016, available at <https://ecfsapi.fcc.gov/file/60001840902.pdf>.

² 47 C.F.R. § 25.136 (Earth Stations in the 27.5-28.35 GHz and 37.5-40 GHz bands); *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, Report and Order and Second Further Notice of Proposed Rulemaking, GN Docket No. 14-177, ¶ 61, FCC, Washington, DC, USA, rel. Jul. 14, 2016 (“*FCC Report and Order*”).

³ See *FCC Report and Order* at ¶ 312.

⁴ Comments of Nokia, GN Docket No. 14-177 et al., Appendix 2, “[Measurements of Fixed Satellite Service \(FSS\) Earth Station Spillover Emissions to Evaluate Potential Interference Levels to Nearby 5G Systems Operating in the 28 GHz Frequency Band](https://ecfsapi.fcc.gov/file/10930005008632/Appendix%20to%20to%205G%20FNPRM%20Comments%20FSS%20potential%20interference%20with%205G%20%20Report.pdf),” filed Sept. 29, 2016, available at <https://ecfsapi.fcc.gov/file/10930005008632/Appendix%20to%20to%205G%20FNPRM%20Comments%20FSS%20potential%20interference%20with%205G%20%20Report.pdf>.

IV. FREQUENCY BAND 37-40 GHZ (QUESTIONS 7-1 TO 7-7)

(Question 7-1.) Nokia supports the ISED's proposal to implement flexible fixed and mobile use licensing in the 37-40 GHz frequency band. (Question 7-2.) Nokia also agrees with ISED's determination to initially continue to license the 38.4-40 GHz band pending finalizing the future framework in this band, based on current utilization of the band.

(Question 7-3.) Nokia fully supports ISED's proposal to align with the new band plan adopted in the United States for the 37.6-40 GHz band plan comprised of 200 MHz blocks. Nokia also agrees that it is prudent for ISED to allow the U.S. band plan to further develop for the range 37-37.6 before adopting a Canadian band plan. However, it is important to note that the U.S. treatment of that lower 600 MHz portion of the band involves sharing with U.S. Federal Government uses not present in the proposed Canadian structure. If the U.S. adopts aspects of its rules that limit commercial operations to accommodate potential U.S. Federal uses, such limitations may not make sense in Canada.

(Question 7-4 and 7-5.) Nokia believes that a good approach to protecting any FSS earth station in 37-40 GHz may be to follow what is adopted in the U.S. Under that framework, an FSS earth station can obtain protection from flexible use stations by obtaining a terrestrial license, entering into an agreement with a terrestrial licensee, or if the FSS earth station conforms to a set of conditions that restrict the geographic areas in which an FSS earth station can be deployed. In addition, the U.S. framework includes provisions that would limit the number of earth stations that would be protected from harmful interference by terrestrial stations in a given license area.⁵ Nokia notes that ISED dismissed the U.S. approach without giving any specific reasons,⁶ and urges that ISED reconsider the merits of the U.S. approach. Nokia agrees

⁵ 47 C.F.R. § 25.136 (Earth Stations in the 27.5-28.35 GHz and 37.5-40 GHz bands).

⁶ Consultation at ¶ 60.

with ISED's modification to Canadian footnote C51 which does not allow for the ubiquitous deployment of FSS in the band. This will facilitate site-by-site coordination of flexible use terrestrial stations and FSS earth stations as the number of FSS earth stations will likely be limited to a small number.

However, if ISED was to adopt a different approach based on a coordination trigger, such an approach should minimize the burden on and cost of deployment of flexible terrestrial stations in the band. In addition, the approach should be based on reasonable engineering methods and consider additional best practice procedures such as the use of site shielding.

(Question 7-6.) Nokia agrees with ISED's proposal that, should space research service (SRS) and/or mobile-satellite service (MSS) systems be deployed in the future in the 37-40 GHz range in Canada, flexible use licensees in the band 37.6-40 GHz may be subject to technical provisions similar to those adopted in the U.S. to facilitate co-existence. We also agree with ISED that any such technical provisions would be established through a future consultation process.

(Question 7-7.) For Grid Cell and Site-Specific FCFS licensees, Nokia does not favour offering protection, nor does it favour making them secondary. Instead, existing licenses should be converted to the new flexible use 200 MHz licenses. In this way, there is only one band plan. Existing users would not have priority or secondary status. Instead, they would be new flexible use licensees with the same coordination requirements as any fixed or mobile flexible use systems in the band. They could continue to operate their existing system, until such time as the existing system would be replaced with a newer system. At the time of system replacement, they would have to coordinate under the prevailing flexible use rules at the time, as a new user.

V. FREQUENCY BAND 64-71 GHZ (QUESTION 8-1)

In the Consultation document, ISED proposes to authorize unlicensed operations in the 64-71 GHz band, creating a 14 GHz block of unlicensed spectrum when combined with the adjacent 57-64 GHz band. While Nokia supports the allocation of additional spectrum for unlicensed services, we note that the ISED's proposal would result in a vast imbalance in the amount of unlicensed and licensed spectrum considered in this Consultation: 7 GHz of allocated for unlicensed operations (from 64-71 GHz) versus only 3.85 GHz allocated for licensed operations (28 GHz, 37 GHz and 39 GHz). The amounts of licensed spectrum and unlicensed spectrum should be more balanced.

While ISED points to the U.S. allocation of the full 7 GHz for unlicensed services, Nokia notes that there were several petitions filed with the FCC for reconsidering allocating at least a portion of 64-71 GHz to licensed use, mentioning that the 66-71 GHz band is among the bands to be studied in ITU towards WRC-19, and has the potential to become a true globally harmonized licensed band.⁷ An FCC decision on this matter is expected before the end of 2017. Therefore, Nokia respectfully suggests that ISED wait for the FCC's decision before finalizing its rules on 64-71 GHz.

⁷ T-Mobile USA Inc., Petition for Reconsideration, GN Docket No. 14-177 et al., at 7-8 (filed Dec. 14, 2016), available at <https://ecfsapi.fcc.gov/file/1214263033932/T-Mobile%20USA%20Inc%2C%20Petition%20for%20Reconsideration%20--%20GN%20Dkt.%20No%2014-177%20-%2012.14.2016.pdf>; Competitive Carriers Association, Petition for Reconsideration, GN Docket No. 14-177 et al., at 5-8 (filed Dec. 14, 2016), available at <https://ecfsapi.fcc.gov/file/121407227897/CCA%20Petition%20for%20Recon%20-%20Spectrum%20Frontiers%20RO%20vFINAL.pdf>; CTIA, Petition for Reconsideration, GN Docket No. 14-177 et al., at 19-24 (filed Dec. 14, 2016), available at <https://ecfsapi.fcc.gov/file/1214290561372/161214%20-%20FILED%20CTIA%20Spectrum%20Frontiers%20Petition%20for%20Reconsideration.pdf>.

VI. SPECTRUM ACCESS CONSIDERATIONS (QUESTIONS 9-1 & 9-2)

Nokia supports licensed access to the 28 GHz and 37-40 GHz bands, for 10-year licensing terms with an expectation of renewal. Nokia also recommends waiting for FCC's decision on whether or not to license at least a portion of the 64-71 GHz band, and adopting a similar framework for licenses in that spectrum range.

Nokia agrees that “license terms in excess of 10 years would create greater incentive for financial institutions to invest in the telecommunications industry and for the industry itself to further invest in the development of network infrastructure, technologies and innovation.”⁸

License terms of ten years or longer and renewal expectations are the norm for good reason. In Nokia's experience, it generally takes several quarters to standardize a new frequency band, another year to develop infrastructure equipment and certify it, and over a year to deploy a network. As such, it is a barrier to investment if a license carries with it uncertainty of termination after fewer than 10 years.

Further, it is envisioned that small cells will be a major part of deploying mobile services in mmWave bands, which will add a greater layer of complexity to roll-out. Small cell deployments involve a relatively large number of sites and can take advantage of a far wider range of locations for deployment (street lights, billboards, sides of buildings, etc.) than can macrocells. As such, in contrast to historic, initial roll-outs of new frequency bands that could leverage existing macrocell sites, deployments in the mmWave bands will require new sites with new power and backhaul services that are not shared with equipment operating in earlier frequency bands.

⁸ Consultation at ¶ 92.

VIII. CONCLUSION

Nokia appreciates ISED's efforts to ensure that Canadian consumers, businesses and public institutions continue to benefit from the latest wireless telecommunications services across the country. Nokia stands ready to work with ISED to meet this goal and urges ISED to unlock the promise of spectrum for 5G as discussed in these Comments.

Respectfully submitted,

Nokia

A handwritten signature in black ink, appearing to read "R. T. Herald", is written over a solid black horizontal line.

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