

**Before the  
INNOVATION, SCIENCE AND ECONOMIC DEVELOPMENT CANADA  
c/o Senior Director, Spectrum Licensing and Auction Operations  
235 Queen Street, 6th floor  
Ottawa, Ontario K1A 0H5**

In the Matter of	)	
	)	
Consultation on Releasing Millimetre Wave	)	Notice No SLPB-001-17 (June 17, 2017)
Spectrum to Support 5G	)	Notice No SLPB-004-17 (July 15, 2017)
Canada Gazette, Part I	)	
	)	

**COMMENTS OF SAMSUNG ELECTRONICS CANADA INC. AND SAMSUNG  
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September 15, 2017

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**I. INTRODUCTION**

Samsung Electronics Canada Inc. and Samsung Electronics Co., Ltd. (hereafter Samsung) are pleased to submit comments in response to the Consultation from Innovation, Science and Economic Development Canada (ISED) on Releasing Millimetre Wave Spectrum to support high-band 5G.

Samsung fully supports ISED's initiative to review the release of new millimeter wave spectrum for the provision of Fifth-Generation (5G) mobile services. 5G services have the potential to revolutionize how we communicate through strongly improved characteristics such as unprecedented data rates, lower latency, spectrum and energy efficiency, and unprecedented mobility for consumers. Samsung shares ISED's view that the release of millimeter wave spectrum will support investment and competition, which will ultimately benefit the quality of services provided to Canadians, and encourage ISED to take a leading role to prioritize development of the 5G ecosystem and adopt technical and service rules which will foster the successful evolution to high-band 5G.

## II. COMMENTS TO QUESTIONS IDENTIFIED IN SLPB-001-17

**Question 4-1: Given the disruptive nature of 5G, will new business models and network applications develop that may require policy and regulatory consideration from ISED? Please describe potential new business models and network applications as well as their benefits to Canadians.**

Samsung believes that 5G systems will differ fundamentally from their predecessors from a spectrum and technology perspective. Unlike existing commercial mobile services, 5G networks will rely on higher frequencies, wider bandwidths, and higher density deployments. Such 5G systems will be able to support groundbreaking applications that will dramatically improve the communication experience of Canadians.

First, 5G will deliver unprecedented data rates regardless of user mobility and/or location, while peak data rates will reach multi-gigabyte-level of speeds. Already several years ago, Samsung completed a 5G network test in the 28 GHz band that achieved network data transmission rates of 7.5 Gbps<sup>1</sup>. The high data rates achieved by 5G systems will help support myriad innovative applications. For example, virtual reality viewing of live events will become more realistic than ever and Samsung demonstrated feasibility of a successful streaming of live 360 degree virtual reality content in 4K UHD<sup>2</sup>.

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<sup>1</sup> Press Release, Samsung, “Samsung Electronics Sets 5G Speed Record at 7.5Gbps, Over 30 Times Faster than 4G LTE” (Oct. 15, 2014), *available at* <http://www.samsung.com/uk/news/local/samsung-electronics-sets-5g-speed-record-at-7-5gbps-over-30-times-faster-than-4g-lte>.

<sup>2</sup> Press Release, Samsung, “Samsung Delivers on Gigabit Wireless Promise of 5G” (Feb. 22, 2016), *available at* <https://news.samsung.com/global/samsung-delivers-on-gigabit-wireless-promise-of-5g>.

Second, 5G systems will experience much lower latency than previous generations of wireless technology. 5G networks will deliver user plane latency of up to less than one millisecond – one tenth the comparable latency of a 4G network<sup>3</sup>. This attribute will help support a variety of services with very low latency requirements, such as critical infrastructure monitoring. Other low-latency services enabled by 5G could include selfdriving cars, public safety communications systems, augmented reality, and “tactile internet”<sup>4</sup>.

Third, 5G systems will be able to support 1 million simultaneous connections per square kilometer. Through this improvement and in addition to enhancing user-to-user and user-to-machine communications, 5G systems will help make the “Internet of Things” a reality. They will support a variety of machine-to-machine services, including wireless metering, mobile payments, smart grid and critical infrastructure monitoring, connected home, smart transportation, and telemedicine.

There are many other characteristics that will improve significantly the performance of 5G systems compared to its precedent systems, such as higher spectral efficiency and mobility, which will also lead to new applications that will ultimately benefit and revolutionize the end-user experience.

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<sup>3</sup> 4G Americas, “4G Americas’ Recommendations on 5G Requirements and Solutions” (Oct. 2014), *available at* [http://www.4gamericas.org/files/2714/1471/2645/4G\\_Americas\\_Recommendations\\_on\\_5G\\_Requirements\\_and\\_Solutions\\_10\\_14\\_2014-FINALx.pdf](http://www.4gamericas.org/files/2714/1471/2645/4G_Americas_Recommendations_on_5G_Requirements_and_Solutions_10_14_2014-FINALx.pdf).

<sup>4</sup> *See id.*

**Question 5-1: ISED is seeking comments on developing a flexible use licensing model for fixed and mobile services in the 28 GHz and 37-40 GHz frequency bands, and allowing licence-exempt use of the 64-71 GHz frequency band ahead of WRC-19 and before 5G technology standards are finalized.**

Samsung strongly supports ISED's proposal to make the 28 GHz and 37-40 GHz frequency bands available for high-band 5G mobile services. Samsung has conducted extensive research and testing on the potential of 5G services and their spectrum requirements. The results of this testing, combined with considerations of coverage, mobility support, and implementation feasibility, support Samsung's conclusion that mobile services can be provided using the 28 GHz and 37-40 GHz frequency bands, among others.<sup>5</sup> The 28 and 37-40 GHz bands are some of the most promising near-term homes for 5G services. This spectrum has positive characteristics that would allow for a relatively smooth transition to 5G. The 28 GHz and 37-40 GHz bands can support wide channel bandwidths, which will be needed to provide the significant performance gains that are expected over 4G services.

Samsung also agrees with ISED's proposal to develop a flexible use licensing model for fixed and mobile services in these bands. A number of existing incumbents are already utilizing the 37-40 GHz spectrum to provide fixed services, and Samsung would expect those services to

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<sup>5</sup> J. Ko et al., "28 GHz channel measurements and modeling in a ski resort town in Pyeongchang for 5G cellular network systems," 10th European Conference on Antennas and Propagation (EuCAP), 2016; S. Hur et al., "Proposal on Millimeter-Wave Channel Modeling for 5G Cellular System," IEEE Journal of Selected Topics in Signal Processing (Volume: 10, Issue: 3), 2016; A.I. Sulyman et al., "Radio propagation path loss models for 5G cellular networks in the 28 GHz and 38 GHz millimeter-wave bands," Communications Magazine, IEEE, vol. 52, pp. 78-86, September 2014.

continue and potentially expand in certain geographic areas in both the 28 GHz and 37-40 GHz bands. This proposal would provide new, flexible rights to operate in their site or area of license and provide the fastest transition to expanded use of the bands.

Regarding the 64-71 GHz band, Samsung recognizes that the global trend for this portion of the spectrum is leaning towards a license-exempt usage.

Samsung believes that ISED should go ahead on releasing the bands as soon as possible to take a leading role in developing the 5G ecosystem. Several countries such as USA, Korea, Japan already announced their 5G spectrum strategies and roadmaps. As ISED is already aware, the Federal Communications Commission (“FCC”) decided to provide 28 GHz, 37-38.6 GHz and 38.6-40 GHz as licensed bands as well as 64-71 GHz as an unlicensed band for early high-band 5G market by announcing their policy and technical regulation on July 14th, 2016<sup>6</sup>. It is expected that the first pre-standard 5G commercial services will be provided by operators in the US from early 2018 using 28 GHz band as the first band for 5G among mmWave bands. On January 21st 2017, Korea MSIP announced the K-ICT Spectrum Plan<sup>7</sup> in order to use the 28 GHz (26.5-29.5 GHz) band for 5G commercial service. In particular, the Republic of Korea is planning to use the 28 GHz band not only for 5G trial services during the 2018 Winter Olympic Games but also 5G commercial services around 2020. Japan MIC published the final report on

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<sup>6</sup> Federal Communications Commission, “Report and Order and Further Notice of Proposed Rulemaking” (Use of Spectrum Bands Above 24 GHz For Mobile Radio Services, et al – Jul. 14, 2016), FCC-16-89, *available at* [https://apps.fcc.gov/edocs\\_public/attachmatch/FCC-16-89A1.pdf](https://apps.fcc.gov/edocs_public/attachmatch/FCC-16-89A1.pdf).

<sup>7</sup> Ministry of Science, ICT and Future Planning, “K-ICT Spectrum Plan” (Jan. 21, 2017), (*in Korean only*) *available at* [http://www.msip.go.kr/dynamic/file/afieldfile/mssw311/1324832/2017/02/22/170118%20석가%20\(보도\)%20K-ICT%20스펙트럼%20플랜%20수립.pdf](http://www.msip.go.kr/dynamic/file/afieldfile/mssw311/1324832/2017/02/22/170118%20석가%20(보도)%20K-ICT%20스펙트럼%20플랜%20수립.pdf).

the 2020 Japan Radio Policy<sup>8</sup> on July 15th, 2016 with regard to their 5G candidate spectrum bands including 28 GHz band, in order to realize 5G in 2020. Also recently, a government & industry initiative to develop a global 5G market in the 28 GHz spectrum band (the 26.5-29.5 GHz band being called “5G Frontier Band”) has been started in order to promote this band for 5G use globally<sup>9</sup>.

From the above decisions and plans in other countries, Samsung expects that high-band 5G, which constitute a significant and essential driver to provide high performance and capacity, will be part of users’ daily life in practice. Samsung encourages therefore ISED to take the earliest opportunity to release the millimeter-wave bands considered in this consultation.

In addition to the bands considered and as ISED pointed out in the current consultation<sup>10</sup>, there are other bands under considerations such as by the FCC or the ITU. Samsung encourages ISED to consider also the adoption of the 26 GHz (24.25-27.5 GHz) band as a next step after the 28 GHz and the 37-40 GHz bands are adopted. This band provides opportunities for increased harmonization with other countries that may not have possibility to use the 28 GHz and/or the 37-40 GHz bands. It should be noted that 3GPP has recently approved a common band plan that compasses the entire frequency range from 24.25 to 29.5 GHz<sup>11</sup>. Considering also current state and progress of relevant technologies, there are expectations that future equipment will be able to

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<sup>8</sup> Ministry of Internal Affairs and Communications, “Radio Policy 2020 Roundtable Meeting Report” (July 15 2016), *(in Japanese only) available at* [http://www.soumu.go.jp/main\\_sosiki/kenkyu/denpa\\_2020/02kiban09\\_03000328.html](http://www.soumu.go.jp/main_sosiki/kenkyu/denpa_2020/02kiban09_03000328.html)

<sup>9</sup> TTA News, “Industry & Government Initiative to develop the global 5G market in the 28 GHz spectrum band” (June 16, 2017), *available at* [http://www.tta.or.kr/English/new/main/news\\_open.jsp?submenu\\_kind=6&notice\\_num=4530](http://www.tta.or.kr/English/new/main/news_open.jsp?submenu_kind=6&notice_num=4530)

<sup>10</sup> This Consultation ¶ 16.

<sup>11</sup> 3GPP TSG-RAN WG4, “Proposed NR frequency range and band combination”, Meeting #83 (May 2017), *available at* [http://www.3gpp.org/ftp/tsg\\_ran/WG4\\_Radio/TSGR4\\_83/Docs/R4-1706325.zip](http://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_83/Docs/R4-1706325.zip).



operate both the 26 GHz (at least part of it if not all) and the 28 GHz bands (up to 29.5 GHz). Canada will have therefore the opportunity to extend the 28 GHz band beyond the current considered limits, so that more spectrum can be available for use.

**Question 6-1: ISED is seeking comments on the changes proposed above to introduce flexible use licensing in the 28 GHz band, including consequential changes to the CTFA domestic footnotes and the policy on this band contained in SP 3-30 GHz, *Revisions to Spectrum Utilization Policies in the 3-30 GHz Frequency Range and Further Consultation*.**

Samsung agrees with the changes proposed to the footnote C47A and welcomes the addition of the new footnote C47C. In line with our comments already provided to Question 5-1, Samsung believes that the 28 GHz band will be the home of significant deployments of mobile service systems and many related initiatives are already taking place in different countries and regions, including in the US that neighbors Canada. In order to ensure a smooth harmonization of spectrum and equipment, the changes proposed by ISED are necessary to ensure that mobile services are protected from undesired interferences that may come from fixed-satellite service systems.

**Question 6-2: ISED is seeking comments on the moratorium for new site-specific fixed service licences as described above.**

Samsung supports the moratorium suggested by ISED on the 28 GHz band. This new consultation may result in the adoption of a new licensing framework that may not be compatible with the current licensing framework. For example, if an area-specific license framework is

adopted as part of this consultation but no moratorium is applied to the current framework, a site-specific license issued from the current framework may partially overlap with a licensed area authorized by the new framework, and further considerations would be required to resolve the conflict. Samsung believes that such situations should be avoided through the application of the moratorium. Also and as ISED mentioned in this consultation, “there have been no licences issued under the current licensing framework for the 28 GHz band”<sup>12</sup>, so no negative impacts are foreseen by applying the moratorium.

**Question 6-3: ISED is seeking comments on its proposal to adopt the band plan (as shown in figure 3 above) in the 28 GHz band.**

Samsung agrees with ISED’s band plan proposal of two unpaired 425 MHz blocks (2 x 425 MHz) and thereby align with FCC’s decision on that matter.<sup>13</sup> We believe that, considering the usage by multiple mobile service providers, contiguous and large spectrum per service provider should be sought to the extent possible in order to ensure high capacity and performance as well as more efficient implementation of future 5G systems. The typical amount required/desired per service provider would vary for each business scenario, but feedback from the industry suggests that in general this would vary between 400 MHz and 1 GHz or above. Samsung is in alignment with this general view and therefore believes that further fragmentation than the proposed unpaired 425 MHz blocks should be avoided.

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<sup>12</sup> This Consultation ¶ 27.

<sup>13</sup> FCC-16-89 at ¶ 72.

**Question 6-4:**

**A. ISED seeks comments on its proposal to require site-by-site coordination between proposed flexible use terrestrial stations and FSS earth stations in the 28 GHz band when a pre-determined trigger threshold is exceeded.**

**B. If site-by-site coordination is proposed, what coordination trigger and value would be the most appropriate (e.g. PFD or distance threshold)?**

**C. ISED is also inviting proposals for specific technical rules on proposed flexible use stations and FSS earth stations (e.g. site shielding) that could facilitate more efficient sharing between terrestrial and earth stations.**

Samsung believes that site-by-site coordination between flexible use terrestrial stations and FSS earth stations is important due to the potentially more diverse locations of mobile service systems compared to fixed service systems. Nevertheless, we believe that sharing between FSS earth stations and flexible use terrestrial stations remains achievable. While a procedure for the operation of fixed earth stations in Canada is already in place as described by ISED in this consultation<sup>14</sup> and the Canadian footnote C47C<sup>15</sup> would not allow for ubiquitous FSS deployment in the 28 GHz band, Samsung believes that a coordination trigger would be an useful addition to these procedure and footnote to ensure a more efficient coordination.

Samsung would propose to use PFD as a coordination trigger. The preliminary studies submitted to the FCC and mentioned by ISED<sup>16</sup> also suggested that interference from a majority of existing FSS earth stations to flexible use terrestrial stations can be manageable if the PFD at

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<sup>14</sup> This Consultation ¶ 31.

<sup>15</sup> This Consultation ¶ 25.

<sup>16</sup> This Consultation ¶ 32 and AT&T, Nokia, T-Mobile, Samsung, Verizon, Ex Parte letter to the FCC (May 6, 2016), available at <https://ecfsapi.fcc.gov/file/60001840905.pdf>.

10 meters above ground level is limited to  $-77.6 \text{ dBm/m}^2/\text{MHz}$  at 200 meters. Such a study could be used as a basis to define an appropriate coordination trigger. It should be noted that the FCC has adopted the above limit to define the area impacted around the FSS earth station when considering the authorization of new FSS earth stations<sup>17</sup>, so we believe a PFD-based coordination trigger could be set lower but not higher than this value.

**Question 6-5:**

**A. ISED is seeking comments on whether there should be restrictions on the geographic areas in which new FSS earth stations can be deployed in the 28 GHz band.**

**B. If geographic restrictions on FSS earth stations are proposed, ISED is inviting detailed proposals on how they could be implemented, and what areas should be targeted.**

Samsung is of the view that geographic restrictions of new FSS earth stations should be considered, especially in and around urban and suburban areas. It is expected that typical future 5G mobile terrestrial stations will be located in major venues of such environments, and their locations would be more ubiquitous than fixed service systems. Samsung understands and believes that the new Canadian footnote C47C would be difficult in practice to be retroactively applicable to FSS earth stations once granted and deployed. Installations of new FSS earth stations in proximity of such venues could raise significant (possibly line-of-sight) interference to future planned 5G systems, including line-of-sight interference depending on the relative locations of those installations, which if not handled carefully could severely hamper the possibility of deployments of 5G mobile systems in these core areas.

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<sup>17</sup> *FCC-16-89* at ¶ 54

Considering the above, Samsung urges ISED to take the appropriate steps to carefully consider the geographic restrictions of FSS earth stations to maximize the potential of 5G mobile systems especially in and around urban and suburban environments and provide confidence to 5G stakeholders that they can safely deploy in these locations. We would therefore support the adoption of similar measures as those decided by the FCC<sup>18</sup>.

**Question 6-6: ISED is seeking comments on whether it should impose any limits on the aggregate emissions of the terrestrial services. If limits are proposed, ISED is inviting detailed proposals on why they should be implemented, and what the limits should be.**

Samsung supports ISED's view that harmful interference from flexible use terrestrial services to satellite stations is not likely, and therefore no skyward interference limit is required. There are several aspects that support this view. First, as mentioned by ISED in this consultation<sup>19</sup>, the very short wavelength property of the millimeter wave bands will enable high-band 5G systems to rely on extremely narrow beamforming and beam-tracking techniques that will optimize transmission from base station to mobile station, and thereby reduce interference in the space direction. Base stations are also expected to be deployed with an antenna downtilt, while mobile stations will rely on adaptive power control algorithms, which will further contribute to reduce the possibility for interference. Second, base stations at such high frequencies would typically be located below rooftops of buildings (e.g. lamp post level) in urbanized outdoor and indoor areas as they are expected to focus on providing capacity over densely populated areas. Therefore, environments surrounding future 5G systems (e.g. buildings,

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<sup>18</sup> *FCC-16-89* at ¶ 54 and 47 C.F.R. Part 25 §25.136.

<sup>19</sup> This consultation ¶ 37.

trees) will provide additional isolation against interference. Third, 5G systems can typically rely on a combination of multiple frequency bands, e.g. with bands below 6 GHz that are better suited to provide large coverage than millimeter-wave bands, or different millimeter-wave frequency bands for example between indoor and outdoor deployments. Further interference reduction towards satellite stations can therefore be expected through the usage of different frequency bands, as the number of potentially interfering base stations and mobile stations in a particular band will be reduced accordingly.

Based on the above observations, Samsung supports ISED's view to not propose any interference limits on aggregate power levels from flexible use systems, and come back on this item in the future only if there is clear technical evidence that such limits are required.

**Question 6-7: ISED proposes that all existing FSS earth stations and those in applications pending approval for operation would be permitted to continue to operate under the current conditions of licence as described above. Comments are sought on this proposal.**

Samsung understands ISED's view that operation of existing FSS earth stations and those in applications pending approval should be respected to the extent possible. However, Samsung also believes that interference impacts of such FSS earth stations to future 5G systems are not clear at this time. Therefore, Samsung invites ISED to keep the door open for the application of additional protection measures in the future to ensure more efficient coexistence between FSS and 5G systems in this frequency band.

**Question 7-1: ISED is seeking comments on the proposal to implement flexible use licensing in the frequency band 37-40 GHz, including the consequential changes to CTFA footnote C51, while continuing to allow for fixed-satellite service (space-to-Earth) in the band.**

Samsung agrees with ISED's proposal to implement flexible use licensing in the 37-40 GHz band and bring the consequential changes to CTFA footnote C51. Similar to our response to Question 6-1 of this consultation for the 28 GHz band, Samsung believes that the 37-40 GHz will also be the home of significant deployments of mobile service systems. Already the US FCC decided to release the 37-38.6 GHz and the 38.6-40 GHz bands for flexible deployment of fixed and mobile services. Given also that the WRC-15 (Resolution 238) decided to study this band as one of the candidate bands for future IMT identification and that preliminary interests have been expressed by some administrations about this band among others in regional meetings, it can be expected that other countries would follow suit, especially if this band is identified for IMT usage.

**Question 7-2: ISED is seeking comments on whether a moratorium on the issuance of new licences under the *New Licensing Framework for the 24, 28 and 38 GHz Bands and Decision on a Licence Renewal Process for the 24 and 38 GHz Bands* is required at this time.**

Samsung understands that the situation in the 37-40 GHz is different from the 28 GHz band because there are already licensees in this band and agrees that the current licenses and their current conditions of usage should be respected. Nevertheless and as soon as it is practicable, we believe that a moratorium would be appropriate for the issuance of new licenses

under the current framework in order to minimize potential conflicts with a new licensing framework that will result from this consultation. ISED stated the following for the 28 GHz band: “[i]t is expected that a moratorium will help ensure that the band is not unnecessarily encumbered prior to the development of a new licensing framework for flexible use in the band”<sup>20</sup>. While Samsung agrees with ISED’s view not to apply a moratorium at this stage, we believe this statement remains valid for the 37-40 GHz band in order to ensure a smooth transition to the new licensing framework.

**Question 7-3: ISED is seeking comments on the proposal to adopt the band plan as shown in figure 7 for the frequency band 37-40 GHz.**

Samsung supports ISED’s proposal to adopt a band plan with 200 MHz blocks for the 37.6-40 GHz band. We believe however that such a band plan can and should be extended to the entire 37-40 GHz range. We understand ISED’s motivation to align as much as possible with related decisions and follow-up discussions in the US regarding this particular band, but at the same time we would like to make the following observations. First, the US FCC is planning to adopt a different band plan for the 37-37.6 GHz band because of the presence of both Federal and non-Federal usage that need to be coordinated with each other through Shared Coordination Service<sup>21</sup>. However, we do not observe any such constraint in Canada, as there is no Federal allocation in this band according to the Canadian Table of Frequency Allocations, and no Federal usage described by ISED in the relevant paragraphs of this consultation regarding the 37-37.6 GHz band. Second, the FCC is considering a channelization of 100 MHz in order to “[strike] the

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<sup>20</sup> This consultation ¶ 27.

<sup>21</sup> 47 C.F.R. §30.7.



right balance between providing enough spectrum for a diversity of wireless uses with helping to minimize the complexity of the coordination mechanism”.<sup>22</sup> Samsung believes that the same justification for choosing a 100 MHz channelization does not apply in the Canadian context for the same reason explained above, and considers that larger channelization is desirable to ensure higher capacity and performance and implementation efficiency of 5G systems. We also do not believe that differences of channelization plans between Canada and the US would create any major technical issues to cope with, and the opportunity to create larger contiguous bands whenever possible should be encouraged.

With the observations above, Samsung prefers therefore a consistent licensing approach and band plan of 200 MHz channels across the entire 37-40 GHz band. A consistent licensing approach, allowing spectrum to be used on an exclusive basis, with full deployment flexibility will permit 5G services to be deployed in a robust fashion.

**Question 7-4:**

- A. ISED seeks comments on the proposal to require site-by-site coordination between proposed flexible use terrestrial stations and FSS earth stations in the frequency band 37.5-40 GHz when a pre-determined trigger threshold is exceeded.**
- B. If site-by-site coordination is proposed, what coordination trigger and value would be the most appropriate (e.g. PFD or distance threshold)?**
- C. ISED is also inviting proposals for specific additional technical rules on flexible use stations and FSS earth stations (e.g. site shielding) that could facilitate more efficient sharing between terrestrial and earth stations.**

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<sup>22</sup> FCC-16-89 at ¶ 454.

As stated in our response to ISED's Question 6-4, Samsung believes that site-by-site coordination between flexible use terrestrial stations and FSS earth stations is important due to the potentially more diverse locations of mobile service systems compared to fixed service systems, and that a coordination trigger would be an useful addition to the existing procedure and the proposed modification to footnote C51 to ensure a more efficient coordination. As in our response to the 28 GHz band, a PFD-based trigger would be appropriate. However Samsung does not have any specific PFD value to propose at this stage.

**Question 7-5:**

**A. ISED is seeking comments on whether there should be restrictions on the geographic areas in which new FSS earth stations can be deployed in the frequency band 37.5-40 GHz.**

**B. If geographic restrictions on FSS earth stations are proposed, ISED is inviting detailed proposals on how they could be implemented, and what areas should be targeted?**

For similar reasons as described in our response to Question 6-5 related to the 28 GHz band, Samsung is of the view that geographic restrictions of new FSS earth stations should be considered, especially in and around urban and suburban areas. Even though in this case it is FSS earth stations that could experience interference from flexible use terrestrial questions, granting new FSS earth stations in proximity of major venues of urban and suburban areas would not in practice facilitate coexistence and implementation of flexible terrestrial services especially if the FSS earth stations are granted and deployed first. The proposed modification to footnote C51

does not provide enough guidance under such circumstances, and therefore further measures would be required to prevent more sharing difficulties that may arise later.

Considering the above and like for the 28 GHz band, Samsung urges ISED to consider geographic restrictions to maximize the potential of 5G mobile systems especially in and around urban and suburban environments and provide confidence to 5G stakeholders that they can safely deploy in these locations. We would therefore support the adoption of similar measures as those decided by the FCC<sup>23</sup>.

**Question 7-6: It is proposed that, should SRS and/or MSS systems be deployed, flexible use licensees in the band 37.6-40 GHz may be subject to technical provisions to facilitate co-existence. Comments are sought. ISED notes that any such technical provisions would be established through a future consultation process.**

Samsung supports ISED's view that there is no need to define any technical provision at this stage to facilitate coexistence with SRS and MSS. Given that there is no existing SRS or MSS operation in Canada for this band, Samsung believes there is no information on which to base and facilitate any coexistence evaluation, and it should therefore be discussed in a future consultation process if the needs arise.

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<sup>23</sup> *FCC-16-89* at ¶ 93 and 47 C.F.R. Part 25, §25.136.

**Question 9-1: ISED is seeking comments on:**

**A. Whether flexible use access in these bands should be exclusively licenced or licence-exempt.**

**B. If a licencing approach is proposed, which types of licences (radio licences, spectrum licences with user-defined licence areas, spectrum licences with service areas for competitive licensing, or others) are expected to best lend themselves to licensing flexible use in the 28 GHz and 37-40 GHz frequency bands in order to support a variety of 5G technologies, applications and business cases?**

**C. Whether a licence-exempt dynamic access using data base should be implemented in all, or portions of the 28 GHz, 37-40 GHz, particularly in the band 37-37.6 GHz.**

Samsung supports the establishment of an exclusive licensing framework for the bands under consideration. Such a framework will produce myriad benefits such as giving licensees the certainty to confidently invest in new infrastructure and promotion of a robust secondary market that ensures that spectrum goes to those who most value it.

Regarding the type of licenses to be applied, there is a balance between the amount of spectrum available, the number of networks and the need to support the establishment of a global competitive equipment ecosystem for 5G. In the initial stage, mobile network operators need to obtain large geographic areas to enable a global equipment ecosystem to develop. Samsung supports therefore spectrum licenses with service areas in order to enable mobile network operators to participate at scale as part of the market development phase.

Samsung proposes a simple and consistent licensing framework for all the bands. In particular, we are not in favour of the introduction of a license-exempt dynamic access framework using a database. As already stated in our response to ISED's Question 7-3, and

given our understanding that there is no Federal usage in any of the bands, there is not the same level of constraint of the need to share the bands in Canada as in the US case. Also, it is our view that such a dynamic sharing access technique through a database is at in its infancy and has not yet been demonstrated to be a viable solution. It is unclear how the status of incumbent licensees would be affected under this framework, which would discourage investments in the affected bands from the start. As 7 GHz of bandwidth is already proposed as license-exempt by ISED in the 64-71 GHz band, we believe there is already sufficient bandwidth available for license-exempt proponents, and this would avoid potential and unforeseen conflicts with future licensees at this initial stage. We believe that at this initial stage, focus should be made on encouraging confident investments, and this is best served by establishing a consistent, exclusive licensing framework.

On a separate note, Samsung recommends ISED to also evaluate the potential of the 3.5 GHz band to support 5G. We believe that this is also a promising band to be considered in the light of the global trend such as in Europe, where the 3400-3800 MHz band is considered as a primary band suitable for the introduction of 5G-based services even before 2020<sup>24</sup>. Such a band would complement in terms of radio coverage the high performance and capacity provided by the millimeter bands considered in this consultation.

### **III. CONCLUSION**

Samsung is enthusiastic about the tremendous potential of 5G and urges ISED to take a leading role in bringing these services to market. With this target in mind, the successful

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<sup>24</sup> European Commission - Radio Spectrum Policy Group, "Strategy Roadmap Towards 5G for Europe – Opinion on spectrum related aspects for next-generation wireless systems (5G)", RSPG16-032 FINAL, November 2016, *available at* [http://rspg-spectrum.eu/wp-content/uploads/2013/05/RPSG16-032-Opinion\\_5G.pdf](http://rspg-spectrum.eu/wp-content/uploads/2013/05/RPSG16-032-Opinion_5G.pdf).

evolution to 5G depends on rapid and thoughtful action from ISED. ISED should prioritize development of consistent allocations for mobile and service rules for 5G in the millimeter wave bands. In addition, efforts should continue to identify and allocate additional spectrum for mobile. By adopting a global approach to 5G that maximizes the potential of each candidate frequency band, ISED will unleash spectrum that will create unparalleled mobile experiences for the Canadian public, and the rest of the world.



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