HUGHES

February 16, 2018

VIA EMAIL

Spectrum Regulatory Best Practices
Innovation, Science & Economic Development Canada
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Dear Sir or Madam:

Re: *Consultation on the Spectrum Outlook 2018 to 2022* – Notice No. SLPB-006-17, *Canada Gazette*, Part I, posted on October 6, 2017, as amended by Notice No. SLPB-010-17, *Canada Gazette*, Part I, posted on December 20, 2017

I. Introduction

1. Hughes Network Systems Canada ULC ("Hughes Canada") and its parent company, Hughes Network Systems, LLC, (collectively, "Hughes), are pleased to submit these comments in connection with the proceeding initiated by the Department of Innovation, Science and Economic Development's (the "Department") *Consultation on the Spectrum Outlook 2018 to 2022*, Notice No. SLPB-006-17 (the "Consultation Document").

2. As discussed in greater detail below, commercial satellite operators have been able to improve the overall performance and spectral efficiency of their satellites to bring to consumers significant benefits in terms of increases in throughput and speeds. Today, customers are served by state-of-the-art, high throughput satellites, with over a hundred frequency-reusing spot beams each, and utilize frequencies in the C, Ku, and Ka bands. Hughes itself has improved the efficiency of its satellites exponentially, achieving two orders of magnitude greater throughput in less than a decade in order to meet the bandwidth requirements of its customers and today provides broadband satellite services

to consumers throughout North America at speeds at and above 25 Mbps down and 3 Mbps up.[1]

3. Further, as recognized by the Department in the Consultation Document, consumer trends toward ever increasing download speeds and throughput capacity require wireless broadband providers, including satellite providers, to utilize more spectrum to meet these expectations. In order to satisfy this consumer demand, satellite operators will need access to significantly more bandwidth (spectrum), largely in the Q and V bands (35-55 GHz) as well as continued access to the bands that they operate in today. In order to meet this growing consumer demand, Hughes has begun construction on EchoStar XXIV/Jupiter 3, an Ultra High Density Satellite that will operate in the Ka and V bands and will offer consumers, including those located in some regions of Canada, download speeds upwards of 100 Mbps.[2] By ensuring that this additional spectrum is available for satellite broadband services, operators such as Hughes will have sufficient capacity to meet the growing demands for broadband satellite services.

4. The satellite and space industry sector is poised to play a significant role in the 5G ecosystem, delivering capacity and offering competitive choices for consumers, businesses and other 5G service providers. It is critical, therefore, to ensure that sufficient spectrum is available for all competitive platforms across multiple frequency bands – low, medium and high – in order to ensure that consumers across the country, no matter where they live, can benefit from the availability of advanced communications services, including 5G.

5. With these considerations in mind, Hughes is providing comments on those questions that have been posed in the Consultation Document that deal specifically with the future

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1 *See* Hughes Networks Systems, LLC, White Paper: Evolution of Hughes Network System, LLC's Broadband Satellite Services from Narrowband to Federal Communications Commission-Defined Broadband Speeds, 10 April 2017 ("Hughes White Paper (2017)") attached at Schedule 1.

2 Hughes expects to launch Jupiter 3 in 2021. *See* Hughes, Application for HNS 95W space station, IBFS File No. SAT-LOA-20170621-00092, filed June 21, 2017; *see also* Hughes Network Systems, LLC, Press Release: Hughes Selects Space Systems Loral to Build Next-Generation Ultra High Density Satellite, August 9, 2017.

demand for fixed satellite service ("FSS") spectrum within the 2018-2022 time horizon and beyond.

II. Overview of EchoStar/Hughes

6. Hughes' parent company, EchoStar Corporation, is one of the largest commercial geostationary orbit ("GSO") satellite operators worldwide; providing broadband, video, and other services to meet the needs of small and large customers, including media and broadcast organizations, direct-to-home ("DTH") providers, enterprise customers, government service providers, and residential consumers in North America and globally. Hughes provides broadband services across the Americas, and recently brought into service the world's highest capacity broadband satellite – EchoStar XIX/Jupiter 2. With the addition of Jupiter 2, Hughes launched its new HughesNet Gen5 satellite Internet service; delivering faster speeds, more data, and built-in Wi-Fi for consumers and small businesses across the continental United States, Southeastern Alaska, Puerto Rico, the U.S. Virgin Islands, Mexico, and key areas within Canada.

7. Hughes provides broadband services to both enterprise customers and wholesale partners, such as such as Xplornet, which makes use of Ka band capacity on the EchoStar XVII/Jupiter 1 and Jupiter 2 satellites to provide high speed broadband services to consumers in Canada, including those residing in some of the more remote and underserved areas of the country.

8. Hughes, its parent, and other affiliate entities also rely on other providers of satellite capacity in order to meet the burgeoning demand for broadband and other satellites services around the world. For example, Hughes is one of the largest, if not the largest, user and purchaser of Canadian satellite capacity, including leases of capacity on Ciel-2 at 129W, Anik F3 at 118.7W, Nimiq 5 at 72.7W, and the soon-to-be-launched Telstar 19 Vantage ("T19V") satellite which will be essential to expand the provision of satellite broadband services in South America. Telesat also provides telemetry, tracking, and

control services to Hughes, its parent, and affiliates along with hosted uplink equipment, facilities, and services.

9. In addition to its satellite services, Hughes develops innovative equipment for the world's communications markets. For example, Hughes pioneered the development of very small aperture terminals ("VSATs") and remains the world's leading provider of enterprise VSAT services. Hughes also designs and develops a wide range of mobile satellite and broadband equipment, such as (i) the Hughes 9211-HDR, a broadband global area network terminal providing mobile satellite connectivity for first responders, mobile healthcare, and public safety operations operating under the harshest conditions; and (ii) the HR4700 Branch Gateway, a broadband device providing enterprise-grade security, routing, broadband optimization technology, and many other services.

10. As a result of Hughes' global leadership in the development of satellite solutions, Worldvu Satellites Limited d/b/a OneWeb selected Hughes to develop the ground system, including gateways and user terminals, for its global low earth orbit ("LEO") satellite constellation. OneWeb's mission is to enable affordable Internet access to everyone, even in the most remote regions of the globe. The joint development of the ground network, currently valued at over USD $300 million, began in 2015 and shipments are expected to begin in mid-2018.[3]

11. Hughes has also begun construction on its next-generation, Ultra High Density Satellite, the EchoStar XXIV/Jupiter 3, which is planned for launch in early 2021 and is being manufactured by Space Systems Loral. The Jupiter 3 satellite will be used to provide state-of-the-art satellite broadband services and capacity to customers throughout North America using the Ka and V band frequencies.

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[3] *See* Hughes Network Systems, LLC, Press Release: Hughes Announces Partnership in OneWeb's Innovative Global Satellite Broadband Initiative to Close the Digital Divide, PR Newswire, 25 June 2015.; *see also* Hughes Network Systems, LLC, Press Release: Hughes Signs $190M Contract with OneWeb for Production of Ground Network System for Global Internet Services, 7 November 2017

III. Discussion

Q10 - ISED is seeking comments on the above demand assessment for FSS/BSS for the period 2018-2022. Is there additional information on demand, which is not covered above, that should be considered with regards to the below bands?

12. In the Consultation Document, the Department noted that the "[o]verall global demand for satellite spectrum is expected to grow significantly between 2017 and 2022,"[4] which is being driven by a variety of factors including ongoing growth in broadband services and applications, such as access to the Internet and over-the-top ("OTT") video distribution, the deployment of new NGSO satellites providing connection speeds that are comparable to terrestrial systems, and satellite broadcasting, such as DTH broadcasting of 4K TV.[5]

13. Hughes agrees with this general assessment of the drivers of demand for satellite spectrum. As indicated in a recent report prepared for the Satellite Industry Association ("SIA"), the commercial satellite sector is continuing to grow unabated, with global satellite revenues reaching $260 billion at the end of 2016, representing a year-over-year growth rate of two per cent.[6] The provision and delivery of satellite services represents the largest segment of this industry sector, with consumer services (including satellite TV, radio, and broadband) representing the primary revenue source.

14. Satellite ground equipment revenues also grew by seven per cent year-over-year led by satellite navigation and chipset sales supporting location-based services and devices.[7]

15. The growing importance of the satellite industry is underlined by both the continued increase in the number of operational satellites in orbit and by the announced plans for new satellites and vast constellations with increasing and diverse capabilities. Over the past five years, the number of operational satellites increased by 47 per cent, rising from

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4 Consultation Document, para. 63.
5 *Ibid.*, para. 66.
6 Bryce Space and Technology, *2017 State of the Satellite Industry Report*, prepared for the SIA, June 2017 ("Satellite Industry Report (2017)").
7 Satellite Industry Report (2017), p. 9.

994 satellites in 2012 to 1,459 at the end of 2016.[8] In addition, work is underway at 3GPP on standards for the non-terrestrial portion of 5G.[9]

16. In the Consultation Document, the Department discusses the demand for spectrum in certain specific satellite bands, namely the C, Ku, and Ka bands, and invites interested parties to comment on its demand assessments for these bands. Hughes does not have any specific comments on the C and Ku bands at this time. However, with respect to the Ka band, Hughes notes that the Department anticipates "significant growth" in demand for spectrum in this band both globally and domestically in Canada. According to the Department:

> Globally, the demand for Ka-band capacity is expected to experience significant growth, with NSR forecasting **an overall increase of 12.1% CAGR for traditional systems and 23.2% CAGR for GEO HTS systems between 2016 and 2025**. Such growth is driven by the demand for broadband Internet access in rural and remote areas. In North America, demand will be high due to the demand for broadband Internet access and data-intensive applications such as OTT television from unserved and under-served areas. **This trend is expected to be similar in Canada, as more HTS systems covering Canadian territory will be deployed, both by Canadian and foreign satellite operators in 2018 and onward, with broadband access being a dominating application in terms of bandwidth demand.**[10]

17. Hughes agrees with the Department's demand assessment for FSS spectrum in the Ka band. This band is ideally suited for the delivery of broadband Internet access services and, as the Department points out, it also features "the smallest antennas of any consumer satellite service, making installation easier and less expensive."[11] In addition, even though this spectrum band is more susceptible to weather-related outages than lower frequency FSS spectrum (*e.g.*, the C and Ku bands), it provides the highest spectrum capacity currently available for the delivery of broadband services.

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[8] Satellite Industry Report (2017), p. 8.

[9] *Seee#*rd Generationa Partnership Project; Technical Specification Group Radio Access network; Study on New Radio (NR) to support non terrestrial Networks (Relesea 15), 3GPP TR 38.811 vo.2.1 (2017-11).

[10] Consultation Document, para. 82, emphasis added.

[11] *Ibid.* para. 81.

18. Hughes was a market leader in recognizing and appreciating the demand towards higher speeds and greater capacity. In particular, in order to meet demand, Hughes designed and constructed a series of increasingly more advanced and spectrally efficient Ka band satellites, beginning first with the launch of Spaceway 3 in 2007, which was then followed by Jupiter 1 in 2012 and then, most recently, Jupiter 2 in 2016.[12]

19. In the 10 years leading up to the launch of Jupiter 2, Hughes experienced a threefold increase in customers on its Ka band satellites. Yet, as a testament to the demand for Ka band-enabled services, more than 100,000 customers, comprised of consumers and small businesses, subscribed to the HughesNet Gen5 Internet service *within the first two months* of the launch of the Gen5 service,[13] and more than 340,000 within the first 6 months.[14]

20. Over the next five years, for Hughes, the Ka band will remain an essential band for broadband services, as utilized for both user terminals and gateways. The satellite technology that is used in conjunction with the Ka band, namely high throughput, multi-spot beam satellites, is capable of providing extremely wide geographic coverage with minimal ground infrastructure, thereby eliminating last-mile construction costs and allowing for immediate connectivity for users located in remote and underserved communities, often at prices that are comparable to those paid by customers in urban centers.

21. The Ka band is also critical in supporting public safety efforts in instances where there is no access to broadband or communication services have become otherwise unavailable. For example, late last year, in response to Hurricanes Harvey, Jose, and Maria, Hughes was able to provide its available infrastructure and capacity to support relief efforts in Texas, Puerto Rico, and the U.S. Virgin Islands, respectively, in order to support the

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12 *See* Hughes White Paper (2017), *supra*, note 1.

13 Hughes Network Systems, LLC, Press Release: HughesNet Gen5 Surpasses 100,000 Subscribers in Just Two Months, 5 June 2017.

14 EchoStar Corporation, Q3 2017 Earnings Call, Transcript, November 13, 2017.

relief efforts.[15] Hughes continues to provide capacity and communications services in several of these regions as the rebuilding process begins in earnest.

22. In addition to being indispensable to public safety, the Ka band is also used increasingly for the delivery of high speed connectivity to earth-stations-in-motion ("ESIM") and will be used by the next wave of large constellation, non-geostationary orbit ("NGSO") FSS satellites, which will employ this spectrum band in their service and feeder link operations.

23. Because of the central role it plays in the delivery of modern day FSS services, the Ka band will be included on Hughes' Jupiter 3 space station and, thus, it is critically important that FSS operators, such as Hughes, have continued certainty in the availability of this band. However, the ever growing demand for broadband connectivity is placing pressure on the Ka band. Indeed, as noted in the Consultation Document, with the anticipated deployment of large constellation NGSO satellites, use by ESIMs, Internet of Things ("IoT") and machine to machine ("M2M"), and the introduction of 4K TV and other services, this will likely place "additional pressure on existing satellite bands and may require new satellite spectrum to be identified."[16]

24. Hughes agrees that new satellite spectrum will, indeed, be required to address the demand for broadband services and applications. In particular, and as discussed in greater detail below, for Hughes and many other commercial satellite operators, the Q/V bands will play a significant role in the future of satellite broadband. This band is already in demand, as reflected in Hughes' application to the Federal Communications Commission ("FCC") of the United States for authority to launch and operate the Jupiter 3 satellite, as well as Telesat Canada's own request to the Department for authority to launch and operate a constellation of 117 LEO satellites in the Q/V bands – a request which was approved by the Department on August 16, 2017.

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15 *See* Hughes Network Systems, LLC, Comments in PS Dkt 17-344, filed January 22, 2018. *See also* Hughes website: Disaster Relief Support.

16 Consultation Document, para. 85.

25. It is important, therefore, to ensure access to the Q/V band for satellite services in order to meet future demands. In the interim, however, the Department should take all steps necessary to ensure that FSS operators have certainty in the continued availability of the Ka band to support their broadband offerings for both user terminals and gateways. This will require not only shared spectrum for gateways, but spectrum that is able to be used on a primary basis to support ubiquitously deployed FSS broadband user terminals.

Q11 – What and how will technology developments and/or usage trends aid in relieving traffic pressures and addressing spectrum demand for satellite services? When are these technologies expected to become available?

26. Satellite operators have made substantial innovations in order to improve the throughput, overall capacity, and available transmission speeds on their satellites. Indeed, over the decade that broadband services have been available over satellite networks, each new network, combined with corresponding technological developments, has substantially improved the efficiency of the spectrum used by the spacecraft.

27. In the case of Hughes' fleet of Ka band satellites, these advances have resulted in a tenfold increase in the capacity available to consumers. For example, the Spaceway 3 satellite achieved a much higher throughput than prior generation Ku band satellites by using a dynamic mesh spot beam downlink network employing the RSM-A standard. This network allowed for higher throughput by reusing frequencies many times across the continent in different satellite beams aimed at different locations. The satellite, which remains in service today, has an overall capacity of 10 Gbps, an increase in capacity of nearly 80 times over the pre-broadband generation.

28. As customer demand for high-bandwidth downloads continued to increase, Hughes' next Ka band satellite, Jupiter 1, utilized technological improvements—the DVB-S2 standard based on LDPC error correction (invented by Hughes) and 16APSK modulation—to achieve aggregate satellite capacity of 120 Gbps, a twelvefold increase in capacity over the prior generation satellite. Jupiter 1 has reliably performed well beyond its advertised

broadband speeds. Indeed, in 2016, the FCC reported that Hughes provided its customers actual upload and download speeds of 195 and 152 per cent of its advertised speeds.[17]

29. Hughes' newest Ka band satellite, Jupiter 2, utilizes the recently developed DVB-S2X standard, which improves upon DVB-S2 by adding higher-order modulation schemes, smaller roll-off factors, and improved filtering. These and other features combine to permit more spot beams across the country to support more overall users. The satellite achieves a total of 220 Gbps capacity – nearly double that of Jupiter 1.

30. With each new satellite, Hughes has exploited advances in efficiency of spectrum use, modulation, and multiple spot beam technology to provide a better quality of experience to its customers. These innovations are summarized in the following table:

Years	Platform(s)	Highest Satellite Capacity	Max Number of Spot Beams per Satellite	Max Service Mbps (Downlink)
2006- 2007	Pre-broadband	1 Gbps	1 (traditional transponder)	1
2008- 2011	Spaceway 3	10 Gbps	24	5
2012- 2016	Spaceway 3 + Jupiter 1	120 Gbps	60	15
2017	Spaceway 3 + Jupiter 1 + Jupiter 2	220 Gbps	138	50

31. The foregoing table illustrates, from the pre-broadband era to 2016:

(a) A 4900 per cent growth in the maximum download speed service offering;

(b) More than a two orders of magnitude growth in satellite capacity; and

(c) A transformation from the single footprint satellite era to the high-throughput, multiple spot beam era, with over 5 times more spot beams used for Jupiter 2 than for Spaceway 3.

[17] FCC, Measuring Broadband America Report 2016, Section A.

32. These enhancements in capacity and customer experience have been enabled by coding improvements (culminating in the use of the DVB-S2X standard) and the use of multiple spot beam transponders, permitting multiple uses of the full Ka band spectrum in the satellite's coverage pattern. Hughes' engineers have developed data compression technologies that improve efficiency and reduce latency for multicast and broadcast video streaming and its satellites use advanced modulation and channel error techniques which result in less bandwidth and power on transmission.

33. The next generation of Ultra High Density Satellite technology is now under development and will be onboard the Jupiter 3 satellite. This technology brings significant benefits to consumers and the public interest more generally, including increased efficiencies in spectrum reuse, faster broadband speeds and increased competition in the 5G marketplace.

Q12 – What satellite applications (e.g. broadband Internet, video broadcasting, backhaul, etc.) do you consider a priority for the period 2018-2022?

34. Demand for broadband continues to grow in every region of the country. More daily consumer, commercial, and public institutional activity relies on of the availability of and access to a reliable, dependable, high-speed broadband connection than ever before – this trend will continue to increase as more and more connected devices are introduced into the market. Hughes has witnessed a more than threefold increase in customers in the past ten years and is bringing consumers broadband speeds of 25/3 Mbps and more, which meets or exceeds current definitions of broadband service.[18] Meeting this demand for broadband access will be the primary challenge for providers across all communications platforms over the next five years. While demand for high-bandwidth downloads continues to increase in every region, in unserved and underserved areas, it is largely unmet. Given Canada's vast land mass and widely dispersed population, Hughes agrees

[18] Currently, the Canadian Radio-television and Telecommunications Commission defines "broadband service" as any service including a 1.5 Mbps or greater download speed: Telecom Regulatory Policy CRTC 2011-291, *Obligation to serve and other matters*, 3 May 2011, para. 18 and footnote 19.

with the Department that satellite will continue to play a vital role in enabling access to ever-increasing download speeds and throughput capacity to Canadians, no matter where they live.[19] The Canadian Radio-television and Telecommunications Commission ("Commission") has established a universal service objective that all Canadians, in urban areas as well as in rural and remote areas, have access to voice and broadband Internet access services on both fixed and mobile wireless networks,[20] including on as many major transportation roads as possible.[21] Recognising that many factors can uniquely affect the performance of mobile wireless broadband Internet access service, the Commission established a broadband universal service objective speed criterion of 50 Mbps download and 10 Mbps upload to be made available to Canadian residential and business *fixed* broadband Internet access subscribers[22] in both urban areas as well as in rural and remote areas. Hughes is already delivering 25 Mbps download/3 Mbps upload speed services today and can be a major contributor to helping the Canadian government to achieve its fixed broadband speed objective, particularly in currently unserved or underserved rural and remote regions of the country. With a scheduled launch 2021, and planned service speeds at or above 100 Mbps, Hughes expects the Jupiter 3 satellite network will play a significant role in helping the Canadian government achieve its connectivity goals.

35. Broadband-enabled healthcare solutions are dependent on a community's ability to access robust and dependable broadband networks. Many of the areas that can benefit most from telehealth for essential medical services, such as for primary care, consultations, and patient monitoring, do not have access to terrestrial broadband services. Satellite

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19 Consultation Document, para. 58.

20 Telecom Regulatory Policy 2016-496, *Basic telecommunications services*, 22 December 2016, paras. 25-39, viz. para. 37.

21 Telecom Regulatory Policy 2016-496, *Basic telecommunications services*, 22 December 2016, paras. 54-64, viz. para. 64.

22 Telecom Regulatory Policy 2016-496, *Basic telecommunications services*, 22 December 2016, paras. 65-81, *viz.* para. 80.

broadband offers high-quality, resilient, already-there coverage for such applications and is currently used to support many of these services.[23]

36. In both urban and rural settings, satellite services are key to ensuring that basic and advanced communications remain available during natural disasters and other emergencies. As noted above, Hughes took a very active role in supporting the U.S. Federal Emergency Management Agency's ("FEMA") relief efforts in the wake of Hurricanes Harvey, Jose, and Maria in 2017. Hughes supported first responders in the field with satellite broadband, as well assisting in getting airports and hospitals back up and operational after the initial onslaught of the crisis. Hughes also provided affected communities with satellite broadband facilities so that people could check in with family and friends via VoIP and Internet. While Hughes is proud to have played a role (and is continuing to do so), the more important lesson that was reinforced by these recent events is the need for governments and public authorities to adopt technological path diversity as a best practice, including in any funding criteria, and to ensure that this principle is incorporated into 9-1-1 and public service answering point architecture.

37. Again, looking ahead, satellites will play a critical role, as a complementary service, in the development and success of 5G infrastructure, including the Internet of Things, especially in a large, dispersed country like Canada. To ensure ubiquitous coast-to-coast coverage, satellite coverage will need to factor into network designs in order to ensure the necessary continuity and resiliency to deliver on the promise of 5G interconnectedness.

38. As stated above, satellite operators like Hughes are continuously working to deliver technological innovations, such as the development of the DVB-S2 and DVB-S2X standards and vast improvements in reduced-latency services with future LEO NGSO systems, in order to satisfy consumer, commercial, and institutional demand for broadband access. However, in order to meet this demand, satellite operators will need access to significantly more spectrum. Applications such as 4K TV and ESIMS are

[23] *See* Hughes Network Systems, LLC, Comments, GN Dkt 16-46, filed May 24, 2017.

placing additional pressure on the Ka band. Given the currently launched and planned operations in the Ka band, the capabilities of available spectrum on the Ka band are essentially at their limit, necessitating migration toward the Q/V bands. Satellite operators like Hughes are currently designing their next-generation satellites to operate in these bands. The ability to safeguard existing spectrum bands for satellite broadband, as well as opening up additional spectrum resources for future growth, is paramount.

Q19 – Provide, with rationale, your view of the above assessments on the bands being considered internationally for commercial mobile, fixed, satellite, or license-exempt.

39. As discussed above, FSS satellite operators require access to additional service- and feeder-link spectrum in order to deliver the next generation of broadband services. Hughes notes that the FCC in the United States recently confirmed that it will enable the use of both the 40-42 GHz and 48.2-50.2 GHz bands for FSS use for user terminals and gateways in order to give satellite operators an opportunity to provide services in the V band.[24] This is consistent with ITU footnotes that recognize the use of this spectrum for high density FSS services in Region 2. Hughes urges Canada to support the use of this spectrum for FSS user terminals at the ITU as WRC 2019 considers Agenda Item 1.13.

40. With respect to the 37.5-40 GHz, the 42-42.5 GHz, the 47.2-48.2 GHz and the 50.4-51.4 GHz bands (also Agenda Item 1.13), Hughes supports the shared use of these bands for individually licensed FSS earth stations with the International Mobile Telecommunications ("IMT") service, which is feasible if the appropriate protections are in place. This means that in terms of sharing, reasonable rules must be in place that provide both services with the required flexibility for deployment.

41. With respect to WRC Agenda Item 9.19, Hughes supports allocating the 51.4-52.4 GHz band available for GSO FSS use in order to address, once again, the burgeoning demand for broadband.

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[24] FCC, Second Report and Order, Second Further Notice of Proposed Rulemaking, Order on Reconsideration, and Memorandum Opinion and Order, FCC 17-152, released 16 November 2017.

Q20 – ISED is seeking comments on the potential frequency bands for release in table 7:
a. the proposed services and/or applications for each frequency band
b. the potential timing of releasing for each frequency band
c. the priority of the release of the frequency bands
Provide supporting rationale for your responses.

42. Hughes has reviewed the frequency bands set out in Table 7 of the Consultation Document and offers the following specific comments:

(a) **40-42.5 GHz:** This band is a critical satellite band that must be preserved in order to address user demand for broadband satellite services. Access by the FSS to spectrum in the 40-42.5 GHz band is required for both satellite user terminals as well as individually licensed earth stations. As noted above, Hughes has a satellite under construction in this band (Jupiter 3) and other satellite operators, including Telesat Canada, are planning to launch satellite networks that will make extensive use of this band. As noted above, the FCC recently confirmed that it will reserve the 40-42 GHz band for FSS use for user terminals and gateways in order to give satellite operators an opportunity to meet consumer demand for broadband services. Hughes supports this determination and encourages the Department to follow suit both in Canada and at the ITU during deliberations on Agenda Item 1.13.

(b) **45.5-50.2 GHz:** The 47.2-48.2 GHz portion of this band can be used for individually licensed FSS earth stations and shared with IMT, subject to reasonable protections. However, the 48.2-50.2 GHz portion of the band should be preserved for satellite use for both individually licensed earth stations and user terminals. As it did with the 40-42.5 GHz band, the FCC has designated the 48.2-50.2 GHz band for FSS use (not shared with 5G) in order to give satellite operators an opportunity to meet consumer demand for broadband services. The Jupiter 3 satellite will make use of this band as will Telesat's recently authorized constellation of 117 LEO satellites.

(c) **50.4-52.6 GHz:** The 50.4-51.4 GHz portion of this band should be used for individually licensed FSS earth stations and can be shared with IMT with

reasonable protection criteria. This is a band that Hughes is planning to use on its Jupiter3 satellite. With respect to the 51.4-52.4 GHz portion of the band, this segment should be allocated for use by GSO FSS, which is currently being studied as part of the 2019 World Radiocommunication Conference Agenda.

Q21 – Are there any other bands that should be considered for release in the next five years for commercial mobile, fixed, satellite, or license-exempt that are not discussed above? Provide rationale for your response.

43. Hughes supports reverse band use by the FSS of the 24.25-25.25 GHz and 37.5-39.5 GHz bands for individually licensed earth stations. Both bands would provide needed additional satellite broadband capacity to meet consumer broadband requirements. The 37.5-39.5 GHz band is currently on the WRC Agenda for 2023 and Hughes supports this agenda item being progressed.

44. In addition, as noted above, Hughes supports the allocation of the 51.4-52.4 GHz band for GSO FSS use.

Q22 – Are there specific frequency ranges/spectrum bands that should be made available for specific applications?

45. There is an increasing trend by regulators internationally to avoid designating spectrum bands for specific applications or certain types of users (*e.g.*, utilities). While Hughes appreciates that some spectrum bands are better suited to certain applications than others, the Department should avoid designating specific spectrum bands for technology-specific applications. This approach limits the potential uses of the spectrum in question and is contrary to the trend internationally which is to encourage operators the ability to use their spectrum for its most optimal use as determined by the market.

IV. Conclusion

46. As noted above, satellite broadband, as well as other applications such as M2M, IoT and ESIMs, are placing pressure on existing spectrum, including in the Ka band, making it necessary to release spectrum in other bands, particularly the Q/V bands, in order to address this escalating demand. Hughes therefore encourages the Department to ensure that sufficient spectrum is made across all competitive platforms and over multiple spectrum bands in order to ensure that consumers across the country, no matter where they live, can benefit from the availability of advanced communications services, including those delivered via satellite.

47. Hughes thanks the Department for the opportunity to participate in this proceeding and looks forward to reviewing the comments of other parties on the demand for spectrum over the next five years.

Jennifer A. Manner
Senior Vice President, Regulatory Affairs

Jodi Goldberg
Associate Corporate Counsel, Regulatory Affairs

HUGHES

SCHEDULE 1

Hughes Networks Systems, LLC, White Paper: Evolution of Hughes Network System, LLC's Broadband Satellite Services from Narrowband to Federal Communications Commission-Defined Broadband Speeds, 10 April 2017

Hughes_Evolution of Broadband Satellites_