



Spectrum Management and Telecommunications

Decision on a Non-Competitive Local Licensing Framework, Including Spectrum in the 3900-3980 MHz Band and Portions of the 26, 28 and 38 GHz Bands

Note 1 (effective June 27, 2023): In D44 and paragraph 425, the deadline for WBS licensees to upload their site information into ISED's Spectrum Management System was extended until July 21st, 2023.

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1. Intent

1. Through the release of this document, Innovation, Science and Economic Development Canada (ISED), on behalf of the Minister of Innovation, Science and Industry (the Minister), announces decisions resulting from the consultation process undertaken in Canada Gazette Notice SLPB-003-22, [*Consultation on a Non-Competitive Local Licensing Framework, Including Spectrum in the 3900-3980 MHz Band and Portions of the 26, 28 and 38 GHz Bands*](#) (the Consultation).

2. [Comments](#) and/or [reply comments](#) on the Consultation were received from:

- Aerial Evolution Association of Canada (AEAC)
- Amazon
- Association of Equipment Manufacturers (AEM)
- British Columbia Broadband Association (BCBA)
- Bell Mobility Inc. (Bell)
- Canadian Association of Wireless Internet Service Providers (CanWISP)
- Celona Inc. (Celona)
- Dynamic Spectrum Alliance
- Ecotel Inc. (Ecotel)
- Eeyou Communications Network (ECN)
- Electricity Canada
- Federated Wireless
- First Mile Connectivity Consortium (FMCC)
- First Nations Technology Council
- Dr. Gregory Taylor
- Internet Society, Indigenous Connectivity Institute, and Mozilla Corporation (ISOC-ICI-Mozilla)
- Meta Platforms, Inc. (Meta)
- Mining Association of Canada (MAC)
- Motorola Solutions Inc. (Motorola)
- NTT Limited (NTT)
- Qualcomm
- Radio Advisory Board of Canada (RABC)
- Railway Association of Canada (RAC)
- Rogers Communications Inc. (Rogers)
- Saskatchewan Telecommunications (SaskTel)
- SES S.A. (SES)
- Smoke Signal Communications Inc.
- Sogetel
- Space Exploration Technologies Corp. (SpaceX)
- SSi Canada (SSi)
- TekSavvy Solutions Inc. (TekSavvy)
- TELUS

- TERAGO
- Transport Canada
- Viasat
- Xona Partners (Xona)
- Xplore Inc. (Xplore)

2. Legislative mandate

3. The Minister, through the [*Department of Industry Act*](#), the [*Radiocommunication Act*](#) and the [*Radiocommunication Regulations*](#), with due regard to the objectives of the [*Telecommunications Act*](#), is responsible for spectrum management in Canada. As such, the Minister is responsible for developing national policies for spectrum utilization and ensuring effective management of the radio frequency spectrum resource.

3. Policy objectives

4. Wireless communication is an integral part of the Canadian economy and is undergoing transformative change due to technological advancements. Not only are consumers, businesses, and public institutions reliant on wireless services and technologies to enable day-to-day activities, they are also increasingly being leveraged to enable a diverse range of innovative and emerging use cases.
5. In this context, ISED is committed to ensuring that Canadians have access to the latest wireless telecommunications services to enable investment and innovation in emerging technologies and services. A robust wireless telecommunications industry drives the adoption and use of digital technologies and enhances the productivity of the Canadian economy.
6. Spectrum is a critical resource for the telecommunications industry and a key enabler of a variety of services, including new technological developments, such as next-generation networks. The fifth generation of mobile technology, known as 5G, is expected to dramatically change the telecommunications landscape and facilitate the delivery of innovative services to Canadian consumers and businesses. The continued development and deployment of 5G technologies is essential to Canada becoming a global centre for innovation, and will bring the country to the forefront of digital adoption, strengthening our world-class wireless infrastructure.
7. The emergence of new technologies is also expected to support the creation and expansion of wireless applications in industry verticals, such as agriculture, mining, manufacturing, healthcare, public safety and transportation. As the needs of these types of users continue to evolve, facilitating access to spectrum in a flexible manner will support the emergence of new and disruptive business models, and drive ongoing investment in 5G networks.
8. In this context, while there remains uncertainty around the anticipated needs of users, and the services and applications expected to deliver the greatest benefit to Canadians, ISED

recognizes the growing demand for spectrum across different industry sectors and the importance of facilitating flexible spectrum access for a variety of users and services. This growing demand is also creating new opportunities for optimizing the use of spectrum and providing new sharing tools that incorporate intelligent decision-making solutions and geographic/operational awareness of the radio environment to facilitate sharing of spectrum between multiple different services and in higher frequencies.

9. As such, ISED views the development of a non-competitive local (NCL) licensing framework as a way to provide a broad range of users, including businesses and industry verticals, with the opportunity to acquire licences in localized areas across the country. In addition, as NCL licensing frameworks generally promote more intensive use of spectrum by means of spectrum sharing, new users should benefit from lower barriers to entry, and reliable, easy access to spectrum. At the same time, to facilitate this access in a timely manner, an NCL licensing framework should also ensure licensees deploy quickly and require that areas without active spectrum use are made available for other users to advance connectivity and innovation goals.
10. ISED is also of the view that an NCL licensing framework should be of general application for use with different spectrum bands. In SLPB-002-21, [*Decision on the Technical and Policy Framework for the 3650-4200 MHz Band and Changes to the Frequency Allocation of the 3500-3650 MHz Band*](#) (the 3800 MHz Repurposing Decision), ISED designated the 3900-3980 MHz band for shared use to leverage the emerging equipment ecosystems for 5G technology and provide opportunities for users including wireless Internet service providers (WISPs), utilities, and industry verticals. Similarly, and subject to final decision, in SPB-001-22, [*Consultation on a Policy and Licensing Framework for Spectrum in the 26, 28 and 38 GHz Bands*](#), ISED proposed to release portions of the mmWave bands (26 GHz, 28 GHz and 38 GHz) for shared use to support innovation and facilitate access to spectrum for industry verticals and other non-traditional users. ISED is of the view that given their potential use cases, both of these spectrum bands are appropriate to release through an NCL licensing framework.
11. Making these spectrum bands available through an NCL licensing framework is expected to support the creation and expansion of new services and applications in industry verticals. These industries may benefit from specialized uses, such as private networks, which enable a wide range of automated, robotic and remote operations for real-time monitoring, dispatching and emergency notifications. For example, agricultural and manufacturing sites are likely to make use of spectrum in these bands for automated operations, such as crop tracking or product traceability, which require high levels of bandwidth and network performance. Private networks are also likely to provide operators with the flexibility to satisfy their specific connectivity and coverage needs and manage their own networks to enable quality of services as they deem appropriate.
12. Further, NCL licensing is expected to support private broadband networks on enterprise campuses, such as universities, stadiums and shopping centres. By focusing on approaches that make spectrum easily available in localized areas, and which facilitate deployment in

different sectors of the economy, Canadian consumers will benefit from the increased investment and innovation that takes place.

13. In addition to facilitating access to new and non-traditional users, releasing this spectrum through an NCL licensing framework will support the development of 5G services by existing users, and can enable wireless broadband services (WBS) and WISPs to bolster connectivity in various regions across the country. This builds on ISED's recent efforts to facilitate access to spectrum in rural and remote areas, including through SLPB-004-21, [*Consultation on New Access Licensing Framework, Changes to Subordinate Licensing and White Space to Support Rural and Remote Deployment*](#), which seeks to introduce a new supplementary licensing process for unused spectrum.
14. More and more Indigenous service providers, business and communities in Canada are taking an interest in access to spectrum. In remote Indigenous communities, access to spectrum can have crucial benefits to accelerating broadband connectivity, establishing reliable cell service, improving access to emergency response services, building economic resiliency amongst Indigenous-led businesses and facilitating the participation and connectedness of remote Indigenous communities with the rest of Canada. An NCL licensing framework can provide access to spectrum to support Indigenous connectivity.
15. In developing this Decision, ISED was guided by the [*Spectrum Policy Framework for Canada*](#) (SPFC), which states that the objective of the spectrum program is to maximize the economic and social benefits that Canadians derive from the use of the radio frequency spectrum resource. This objective and the enabling guidelines listed in the SPFC remain relevant for guiding ISED in delivering its spectrum management mandate.
16. In May 2019, the Government of Canada released [*Canada's Digital Charter*](#). The Digital Charter listed universal access as the first of ten principles that laid the foundation for a made-in-Canada digital approach, and continues to guide policy thinking and actions towards establishing an innovative, people-centred and inclusive digital and data economy built on trust. Universal access is the principle that all Canadians will have an equal opportunity to participate in the digital world and have the necessary tools to do so, including access, connectivity, literacy and skills.
17. Through Canada's [*Innovation and Skills Plan*](#) and its focus on people, technologies and companies, the Government of Canada is committed to promoting innovation-led growth across all sectors of the Canadian economy. The ubiquity of digital technologies and services across sectors is a defining feature of the new digital economy and enabling greater access to spectrum will allow all sectors to benefit.
18. The decisions set out in this document support the objectives of the [*Telecommunications Act*](#), the SPFC, the Digital Charter, Canada's Connectivity Strategy and Innovation and Skills Plan, through the use of an NCL licensing framework that facilitates innovation across the Canadian economy. Consequently, ISED's policy objective for the NCL licensing framework, including the release of spectrum in the 3900 MHz band and portions of the mmWave bands, is to promote innovation by enabling Canadian companies to invest in,

develop and deploy 5G networks and technologies that enhance productivity in the Canadian economy, through three guiding principles:

- facilitating low-barrier access to spectrum to support the needs of new users, including industry verticals
- providing increased flexibility of spectrum use to support a variety of use cases
- ensuring areas without active spectrum use are quickly made available to others

4. Background and context

19. Technological innovations, such as 5G, the emergence of new business models, as well as the continuing growth in wireless communications, have resulted in a greater demand for spectrum in mid and high bands. As such, international telecommunication regulators are seeking to implement additional spectrum licensing approaches that complement traditional authorization models. These approaches aim to facilitate the deployment of wireless networks in smaller, more geographically targeted areas while providing predictable service quality to meet emerging needs and diverse uses (e.g. industry verticals, rural and remote broadband providers).
20. Local licensing is a general term used to refer to various emerging licensing framework approaches that provide flexible access to meet the relatively small-scale connectivity needs of wireless service providers and individual spectrum users alike. The development of such approaches has been driven by rapid global data use, including automation advances in manufacturing, agriculture and resource industries where wireless connectivity is needed for specialized applications with low latency over limited areas. Typically, the regulatory frameworks that support local licensing target multiple concurrent objectives, including: simplicity and flexibility in licensing; enabling access to more and varied spectrum users; and advanced sharing.
21. An advantage of a local licensing framework is its scalability, which allows it to meet a variety of needs in areas of different sizes, from smaller mining sites to larger farms and communities. The scalability of local spectrum licensing would facilitate service delivery, especially in rural and remote areas. In addition, this scalability will provide licensees the ability to meet the needs of these types of uses as they continue to evolve, support the emergence of new and innovative business models, and drive ongoing investment in 5G networks. By focusing on approaches that make spectrum easily available in localized areas and that facilitate deployment in different sectors of the economy, ISED enables Canadian consumers to benefit from the resulting increase in investment and innovation.
22. In August 2022, ISED published the Consultation, which sought comments on a general NCL licensing framework and proposed to apply it to the 3900-3980 MHz band (referred to as the 3900 MHz band) and portions of the 26 GHz, 28 GHz and 38 GHz bands (millimetre wave bands, or mmWave bands). Given that these bands have unique characteristics and considerations, ISED consulted on specific measures, under the general NCL licensing framework (see section 5 of the Consultation), and specific to each band (see section 6 of the Consultation for the 3900 MHz band and section 7 of the Consultation for the 26 GHz, 28 GHz and 38 GHz bands). In the future, ISED will consult on the application of the

general NCL framework when licensing or renewing other bands and may also conduct further consultation on bands with established NCL licensing frameworks to introduce, adjust or remove measures, as necessary.

5. Non-competitive local licensing framework

23. In recent consultations and decisions, ISED indicated that it will consider making certain portions of bands available for fixed, mobile or flexible use services using a non-competitive (i.e. not auctioned or otherwise competitively assessed) licensing framework for local areas, in support of the policy objectives discussed in section 3. Following the Consultation, ISED intends to establish an NCL licensing framework that can be applied generally to multiple bands, but that also has the flexibility to be tailored to address the unique characteristics and considerations of each band.
24. Recognizing that the application process may be complex for some local licensing applicants as it requires an in-depth understanding of wireless services and technologies, ISED will consider NCL licensing approaches that reduce the administrative burden on applicants and continue to consider options to facilitate partial or full automation of the licensing process for bands to which the NCL licensing framework is applied.

5.1 NCL licensing approach

25. In the Consultation, ISED considered three broad types of licensing. The three broad types of licensing are:
 - all-come, all-served (ACAS)
 - first-come, first-served (FCFS)
 - dynamic spectrum access

Each type of licensing has its advantages and disadvantages. ISED sought comments on its proposal to implement a FCFS spectrum licensing system for its NCL licensing framework.

Summary of comments

26. Bell, Ecotel, Electricity Canada, Indigenous Connectivity Institute, Internet Society, Meta, ISOC-ICI-Mozilla, NTT, Qualcomm, Rogers, TekSavvy, TELUS and Xplore supported implementing an FCFS licensing approach. They cited benefits such as protection from interference to licensed operations and assistance in mitigating congestion issues.
27. Bell commented that an FCFS licensing approach provides a specified level of protection from interference to licensed operations and helps to mitigate the congestion and interference issues. Ecotel stated that FCFS is the perfect balance between interference protection, ease of use and reduced complexity. Electricity Canada noted that FCFS is a good mechanism for its members to deploy 5G systems in the 3900 MHz band. TELUS commented that FCFS spectrum licensing with an automated licensing process could be a positive step forward in serving local communities. TekSavvy supported FCFS, which

provides operators with the certainty required to invest in equipment in the NCL licensed bands.

28. Some respondents conditionally supported an FCFS licensing approach with the understanding that certain measures will be adopted. Rogers supported FCFS provided that access to the NCL licensed bands are not unduly restricted. TELUS favoured an FCFS system with safeguards for the coexistence of in-band and adjacent band services and operational guidelines for potential NCL licensees who may lack engineering expertise.
29. Conversely, CanWISP, MAC, Sogetel and SSi Canada expressed concerns about the implementation of an FCFS licensing approach. CanWISP encouraged ISED to implement an ACAS framework instead of an FCFS as it was of the view that operators will not have the flexibility to expand and evolve their networks in response to changing technology and consumer demand. SSi Canada commented that FCFS would introduce a licensing technique developed for permanent usage and recommended waiting for the availability of dynamic spectrum access for the best tools to facilitate access to spectrum on a local or temporary basis. MAC was of the view that an FCFS licensing approach could benefit large companies that are more familiar with the licensing process by gaining an advantage to acquire all available licences prior to mining companies having an opportunity to access spectrum.
30. FMCC opposed an FCFS licensing approach. FMCC was of the view that incumbent providers might apply for spectrum before small and Indigenous providers are aware of the opportunity or are able to prepare and submit an application.
31. Federated Wireless encouraged ISED to implement a dynamic spectrum access-enabled ACAS solution and disagreed with the characterization of dynamic spectrum access systems in the Consultation. Dynamic Spectrum Alliance recommended that ISED adopt an ACAS model and allow dynamic spectrum access, once a service provider is designated by ISED to manage access to the NCL licensed bands.
32. Xona added that in the absence of viable dynamic spectrum access technology, an ACAS approach would have the least burden on potential users of the spectrum and ISED even if it would require coordination among users.
33. Xplore explained that it is premature for ISED to consider any licensing models in relation to mmWave spectrum, as the business cases are not yet clearly defined.

Discussion

34. ISED recognizes that the ACAS licensing model has some advantages. It has a low administrative burden for both ISED and operators, has no priority among operators and no restriction on where operators can acquire spectrum. ACAS has the disadvantage of increased potential for interference between systems and congestion since it is not managed by ISED. As a result, the quality of service for NCL licensed operations could fluctuate due to a changing environment and may be subject to possible harmful interference, which would not meet the policy objectives.

35. ISED is of the view that an FCFS licensing approach would be appropriate for a local licensing model, where operators may be located very close to each other. FCFS licensing also allows for a low barrier to entry for licensees and provides managed access to spectrum that increases certainty for licensees. The advantages of FCFS licences are that they provide a specified level of protection from interference to licensed operations and help to better mitigate interference issues than an ACAS licensing regime, providing a level of certainty to businesses for planning and investment purposes. The disadvantage is that an FCFS approach may not maximize the number of operators as thoroughly as ACAS.
36. FCFS has long been implemented in many bands used by land mobile and fixed radio services, has allowed for long-term growth in those bands, and has provided a balance between access and long-term certainty. However, land mobile and fixed radio services are typically managed on a station-by-station basis, which requires licensees to request a licence for each radio equipment. For NCL licensing, ISED will implement an FCFS spectrum licensing regime that will allow licensees some additional flexibility and scalability for deploying stations under their licences as long as they meet the technical rules and conditions of licence required for interference mitigation.
37. Due to the local licensing nature of the framework and the potential high number of licences, and in order to limit processing delays related to a high number of applications, ISED may automate some or all parts of the FCFS application and review process to ensure timely assessment of applications.
38. ISED recognizes that there are new sharing technologies and techniques, such as dynamic spectrum access, being developed that will change the way spectrum is accessed through dynamic decision-making solutions and geographic/operational awareness of the radio environment. ISED sees the adoption of an automated system for FCFS spectrum licensing as a first step towards a spectrum licensing regime that could be made available through dynamic spectrum access in the future and is of the view that the NCL licensing framework will not preclude a future, more dynamic, approach.
39. ISED may require that NCL licences change frequencies in some instances after an NCL licence is issued for spectrum planning purposes, or to manage interference. In these instances, ISED will provide sufficient time for NCL licensees to change frequency. Thus, NCL licensees are encouraged to deploy equipment that can be tuned across the entire band where the NCL licensing framework is applied, to ensure continuity of service.

Decision

D1 ISED will adopt an FCFS spectrum licensing approach for the NCL licensing framework.

5.2 NCL licensing areas

40. As discussed in the Consultation, different sizes of licence areas are best suited to different wireless services and applications. Local licensing approaches aim to facilitate the deployment of networks that use more targeted spectrum licence areas than those that have been used for wide area licensing to date. ISED expects that the use cases for NCL licensing would include, but not be limited to:
- adding targeted capacity for fixed wireless access systems in rural, remote, and northern communities, including Indigenous communities
 - private broadband networks on enterprise campuses (e.g. universities/colleges, stadiums, shopping centres, office buildings)
 - private networks to support vertical industrial uses, including automation, in industries such as agriculture, manufacturing, and mining
41. The NCL licensing approach enables a licence applicant to only apply for their specific area of interest, as opposed to larger licence areas pre-determined by ISED (e.g. Tier 5 service areas). This approach helps to minimize the cost of the licence by requiring licensees to pay for only areas where they intend to deploy. In addition, this approach would ensure that spectrum is accessible to other potential licensees in remaining areas, thus maximizing the efficient use of the spectrum.

5.2.1 Radius-based versus custom vector-based in urban and rural areas

42. ISED sought comments on the appropriate basis to establish local licence areas for the NCL licensing framework:
- a radius-based licence area, based on a specified circular licence area with a defined radius from a specific geographic point (central point)
 - a custom vector-based licence area, based on a specified licence area with a self-defined boundary
 - any alternative methods
43. ISED also sought comments on whether the same spectrum licensing area approach (i.e. radius-based or custom vector-based) should be available in all areas, or if rural and remote areas should have a different system compared to metropolitan and urban areas. Some operators, such as wireless Internet service providers, may target relatively large rural or remote areas compared with more localized use in urban areas for private networks. ISED also sought comments on whether site licensing should be used in rural and remote areas.

Summary of comments

44. **Radius-based versus custom vector-based:** Among the stakeholders that responded to this question, ECN, ISOC-ICI-Mozilla, Rogers and Xona supported a radius-based licence area. Rogers argued that it is important to ensure that the NCL licensed spectrum has the ability to provide service into the intended coverage area while also not causing interference to other systems. Xona was of the view that a radius-based licence area generally provides less of a challenge to prospective licensees and is easier to implement than a custom vector-based

licence area. Similarly, ISOC-ICI-Mozilla stated in their opinion that a radius approach would be the simplest option. ECN submitted that, in rural and remote areas, radius-based licensing or site licensing allowing multiple radios per site seems more practical and coherent with the signal propagation of cellular towers. However, ECN acknowledged that each methodology has its advantages and disadvantages.

45. Bell, CanWISP, Celona, Dynamic Spectrum Alliance, Ecotel, Electricity Canada, Federated Wireless, Motorola, NTT, Qualcomm, RABC, RAC, Sogetel, TekSavvy, TELUS and Xplore supported a custom vector-based licence area. They argued that it would provide the flexibility to define the exact areas needed and maximize the use of spectrum, both by gaining the ability to put NCL licensed operations closer together and by not having to license unneeded areas as part of a radius-based area. Electricity Canada also noted the fee impacts of not licensing unneeded areas as part of a radius-based system. Qualcomm noted that the flexibility of the custom vector-based model allows a single model to address multiple use cases. RAC commented that this approach is better suited to linear use cases such as railways. Sogetel noted the lower administrative burden of having a single licence, as opposed to a radius-based licence area, which could require building a network from many radii.
46. CanWISP argued that using custom vector-based licence areas allows applicants to simply and clearly define the intended coverage area. It further recommended that ISED limit vertices of a service area polygon to 100, divide licence areas that span multiple Tier 5 service areas into multiple individual licences for administrative purposes, and implement a fee and restrictions regime that is based on the relevant categorization of each service area. CanWISP's suggestions on licence areas and fees were echoed by TekSavvy.
47. Ecotel reasoned that using a circular (radius-based) licence area would lead to inefficiencies because signal propagation in the C-Band is strongly influenced by topography and land cover. In addition to Ecotel's recommendation on the vectors, it requested that ISED stipulate that spectrum applicants include stamped engineering calculations in their application.
48. SpaceX argued that if ISED adopts a custom vector-based licence it should limit licences to private, indoor use cases where the risk of harmful interference to and from other users is manageable.
49. Other stakeholders, including Meta and SES, suggested a combination of ISED's two proposed options. Meta recommended using a radius-based licence area in urban areas and a custom vector-based licence area in suburban and rural areas. SES suggested ISED adopt a case-by-case approach to determine whether to apply a radius-based or custom vector-based licence area, using a process that assesses aspects such as a licence area's population and the physical size of an urban core. Additionally, in the case of vector-based licence areas, SES argued that service to some areas within the vector-based polygon can be intentionally avoided if the polygon is sufficiently large.

50. **Type of licence area in urban versus rural areas:** Stakeholders including Bell, CanWISP, Celona, Dynamic Spectrum Alliance, Ecotel, Electricity Canada, Federated Wireless, Motorola, NTT, Qualcomm, RABC, Sogetel, TekSavvy, TELUS, and Xplore supported using the same spectrum licensing area approach in all areas.
51. Stakeholders such as Motorola and Sogetel commented on the flexibility and efficiency enhancements that would result from implementing a vector-based approach in both urban and rural/remote areas. Meanwhile, Dynamic Spectrum Alliance recommended that ISED permit new NCL licence applicants to customize their licence area requests, which would eliminate the need to distinguish between urban and rural/remote areas, simplify the application process, and minimize the administrative burden for licensees as well as ISED.
52. As highlighted above, Meta recommended the use of a radius-based licence area in urban areas and a custom vector-based licence area in suburban and rural areas.
53. SES suggested that ISED should apply the spectrum licensing area that is most appropriate based on specific technical characteristics and other relevant factors of each licence area.
54. FMCC, Rogers and Xona supported the use of site licensing in rural and remote areas. Rogers argued that using site-based licensing in rural and remote areas would guarantee that only necessary spectrum is allotted. Rogers acknowledged that site licensing could create additional administrative work for some network operators but stated that the benefits of ensuring spectrum access and the potential of automation to further streamline licensing applications outweigh the disadvantage of additional administrative burden.
55. Xona argued that coverage is key for businesses in rural and remote areas, and that base stations are fixed to a specific location in fixed wireless access (FWA) applications. Therefore, Xona argued that site licensing best fits the operational requirements of FWA deployments in rural and remote areas. Furthermore, FMCC recommended that ISED implement site licensing in Indigenous territories in a process that respects Indigenous treaty rights.
56. While many stakeholders supported using the same spectrum licensing area approach in all areas, Bell, CanWISP and TekSavvy explicitly opposed site licensing in rural and remote areas. Bell argued that site licensing in rural and remote areas would complicate the automated assessment of interference as a complete analysis would be required each time a site is added. CanWISP and TekSavvy agreed that there is no compelling reason to propose site licensing in remote areas.

Discussion

57. **Radius-based versus custom vector-based:** To date, ISED has made spectrum licences available using predefined licensing areas such as the tier-based [service areas for competitive licensing](#). Through the NCL licensing process, ISED is developing an approach to spectrum licensing that enables a licensee to apply for an area that closely aligns with

their intended service area (i.e. the area where the licensee can deploy base stations and user terminals). This minimizes the cost of the licence while also ensuring that spectrum is available for other interested parties in remaining areas.

58. In addition, ISED has sought to develop an approach that is accessible to licensees of different scale and experience levels, thereby facilitating low-barrier access to spectrum to support the needs of new users, including industrial verticals. Consideration has also been given to facilitating automation to allow for easier access to these licences. A key factor for ISED in designing this process is to maximize simplicity for spectrum users wherever possible.
59. Stakeholder comments were largely in favour of a custom vector-based approach. ISED shares the view of proponents of the custom vector-based approach that while both the radius-based and custom vector-based approaches can accommodate large or small licence areas, the custom vector-based approach is more flexible as it can easily accommodate any area size with a potential single licence. Under a radius-based approach there may be a need to apply for multiple overlapping licences to cover an intended area. Having multiple overlapping radii to cover a specific area adds complexity to the definition of the licence area and could lead to higher licence fees. Furthermore, different bands using the NCL licensing framework in the future could require different radii, which could create confusion. In addition, specialized licence area shapes, such as for railway tracks or backhaul, would be simpler to construct using a custom vector.
60. The custom vector-based approach is also more scalable and can better expand to account for use cases that require coverage of larger areas, as the licence area boundaries are not restricted to a circular shape. The radius-based approach could result in the licensing of unneeded areas, whereas the custom vector-based approach would lead to higher spectrum efficiency and the ability to fit neighbouring operators closer together.
61. This flexibility in licence area creation for the vector-based approach will be advantageous when looking to the future. ISED may apply the NCL licensing model to other bands with different propagation characteristics and may need to accommodate future use cases. As any shape can be created, the custom vector-based approach has the most flexibility for accommodating any use case or frequency.
62. One potential risk of the custom vector-based approach is that operators might apply for very large areas without the intention or ability to service them, in order to prevent competition. ISED notes that if not all areas are being serviced it would not align with the objective of targeted licensing or could also lead to spectrum warehousing to stifle competition (i.e. a small number of large licences creates a barrier to entry and makes spectrum less accessible under an FCFS model). As such, ISED will consider additional measures to support local licensing on a band-by-band basis, as discussed in section 5.3.
63. **Type of licence area in urban versus rural areas:** In developing the licensing areas that would be used for NCL licensing, ISED also sought to maximize simplicity wherever possible. Different licensing systems in different areas would add complexity as there would

be the potential for two sets of rules and procedures, two sets of technical specifications, two sets of measures to facilitate access, and possibly different fee structures. Furthermore, operators that may be operating in both types of licence areas would be required to adhere to separate rules.

64. Some stakeholders raised concerns regarding deployment of fixed and fixed-wireless access stations under a vector-based licence, arguing that a different type of licensing should be used for rural areas. ISED is of the view that fixed or fixed-wireless sites can be accommodated under a custom-vector approach for NCL licences in bands that have been designated as flexible use for mobile and fixed services.
65. As noted previously, custom vectors have the flexibility to accommodate all desired area shapes, are scalable to any size of licence, and can accommodate the expected mix of services that would be deployed in different areas. Therefore, ISED will implement a vector-based approach for licence areas in urban and rural areas.
66. However, ISED also acknowledges that the size of network for the various use cases can vary considerably, such as when comparing a university campus in a city to a fixed wireless network in a rural area. Rather than having different licence area paradigms in urban and rural areas, ISED will accommodate these differences by applying different power level restrictions. See section 5.2.2 below for a discussion on differentiation through power levels.

Decision

D2 ISED will implement a custom vector-based approach for all licence areas under the NCL licensing framework.

5.2.2 Technical parameters and challenges with higher maximum power in rural and remote areas

67. ISED recognizes that in some countries, to facilitate sharing and NCL licensing in non-commercial mobile bands (for example, the Citizens Broadband Radio Service (CBRS) 3550-3700 MHz band (CBRS band) in the US and the Spectrum Access 3800-4200 MHz band in the UK), regulators have set lower maximum permissible power levels in these shared bands compared to the higher power levels in adjacent commercial mobile bands.
68. To better serve customers located across larger geographic areas, ISED has sometimes allowed the use of higher maximum permissible power levels outside of urban and metropolitan areas (e.g. 800 MHz cellular, 1900 MHz Personal Communication Services (PCS)). This allowance is often dictated by the frequency band employed and the intended applications. In the Consultation, ISED sought comments on the maximum permissible power levels and whether higher maximum permissible power levels should be used in rural and remote areas. Additionally, ISED sought comments on the potential technical challenges between higher power and lower power systems operating in close proximity.

Summary of comments

69. **Maximum power levels for rural and remote areas:** RABC supported the adoption of power levels similar to those used in the existing licensed 3500 MHz band. RABC did, however, note that such power levels could be challenging when using Tier 5 service areas, as it may be difficult to contain the radio frequency (RF) energy within the intended coverage area. Ecotel explained that applying the same power levels used below 3900 MHz would maximize the performance of radio links, which is needed particularly in rural and remote areas.
70. Qualcomm urged ISED to refrain from limiting NCL licensees to low-power operations in urban or any other areas, as this would impede the successful deployment of viable use cases in the 3900 MHz and mmWave bands.
71. For NCL licensing in mmWave spectrum, Rogers and TELUS recommended that the maximum power levels in the mmWave bands be the same as those established for licences obtained through a competitive process. Rogers noted that this should not apply to NCL licensing in the 3900 MHz band, regardless of urban or rural service areas.
72. CanWISP, Rogers and TekSavvy, supported by Bell in its reply comments, suggested that power levels for NCL licensing be aligned with those used in the 3600-3650 MHz WBS band. Bell further noted that maximum power levels for NCL licensed operations should be lower than what is allowed for commercial mobile systems in adjacent spectrum bands given the expected targeted licence areas and the need to have licence areas as close together as technically feasible.
73. Federated Wireless, Motorola, Qualcomm and Xona suggested adopting power levels used in CBRS. Motorola and Qualcomm argued that the higher power level in CBRS deployments has been shown to effectively alleviate high clutter losses in mid-band due to foliage, building, and other factors in urban areas. Dynamic Spectrum Alliance supported this view and added that these power levels have been proven sufficient for both urban LTE/5G deployments as well as rural and remote WISP operations. Xona additionally proposed that there be no antenna height restrictions for outdoor deployments.
74. Through its reply comments, ISOC-ICI-Mozilla added that the power levels allowed for shared access licensees and local access licensees in the UK would be sufficient for most purposes. ISOC-ICI-Mozilla suggested that ISED, at its discretion, allow higher power levels on request, since this would allow for higher output power levels in rural areas where there is demonstrated need/demand.
75. If relatively lower power limits are permitted in the NCL licensing bands compared to the power limits allowed in adjacent commercial bands, CanWISP and TekSavvy proposed that NCL licensees be permitted to use equipment already certified for commercial mobile bands but operating at the lower power levels authorized for the NCL licensing bands. In their opinion, this would enable NCL licensees to access the same widely available equipment ecosystems.

76. **Higher max power levels for rural and remote:** In response to whether higher maximum permissible power levels should be permitted in rural or remote areas, Bell, Celona, Federated Wireless, FMCC, Motorola, ISOC-ICI-Mozilla, Qualcomm, RABC, RAC, Rogers, Sogetel, SES, TELUS, Xona and Xplore generally supported the proposal, arguing that this would facilitate cost-effective deployments in those areas and provide access to a larger equipment ecosystem. Sogetel further noted that if unique restrictions are imposed on the equipment to be used in non-competitive licensing processes, this risks inhibiting the achievement of policy objectives by creating restrictive equipment availability. In its reply comments, BCBA supported Sogetel's views.
77. Qualcomm commented that higher power levels in rural areas will enable WISPs and other potential NCL licensees to maximize the coverage and data rates appropriate for a variety of use cases. As an example, it indicated that the Federal Communications Commission (FCC) adopted rules to permit higher power operations in the competitively licensed commercial mobile portion of the C-band in rural areas. Xona noted that higher maximum permissible power levels in rural and remote areas would also benefit enterprises in verticals such as agriculture, forestry, mining, oil and gas, electric utilities and other such verticals, which typically operate over large open areas. Celona and Ecotel emphasized that low-power deployment limitations could adversely impact the targeted use cases intended for the NCL licensing framework, such as industry verticals and Ultra-HD video surveillance for real-time monitoring, dispatching and emergency notifications. Instead, Celona suggested that interference mitigation measures could be used such as adopting an appropriate equivalent isotropically radiated power (e.i.r.p.) or a power-flux density (pfd) limit at the licence area boundary or limiting out-of-band emissions (OOBE). NTT shared a similar view while Ecotel reiterated the benefits of their proposed dual concentric contour approach (described in section 5.2.3) to establish a licence area to mitigate interference.
78. TELUS recommended that ISED enable the option for higher power licences in the NCL licensed band for rural and remote areas, subject to the condition that NCL licensees are able to coexist with adjacent block and band services. Rogers noted that a relatively higher power in less densely populated areas, such as deep rural and remote areas, may be feasible as there is less likelihood of causing interference to other systems on the basis that there would likely be fewer of them close to deployed systems. In its reply comments, TELUS supported views that suggested adopting the same power limits used in the 3500 MHz band for rural areas deploying NCL licensing bands.
79. RABC, supported by TELUS in its reply comments, recommended having notional classes of low-, medium-, and high-power licences to facilitate a broad range of applications, including higher power applications for new and existing NCL licensees that may wish to serve rural and remote communities. Conversely, CanWISP believed that the same power levels should be applied in both metropolitan and urban areas and in rural and remote service areas.
80. With regard to the 28 GHz band, SES indicated that it would not object to maximum permissible power levels for rural or non-rural areas that are consistent with the World Radiocommunication Conference-2019 (WRC-19) studies and recommendations for

compatibility with fixed satellite service (FSS) uplinks. In its view, NCL licences are intended to serve localized areas and are not a substitute for wide-area, public 5G services. However, under such an approach, it proposed that a pfd limit to protect FSS downlink earth stations in the 38 GHz band be implemented. As a result, the higher the power levels allowed for NCL licensing operations, the greater the separation distance that would be required to protect receiving earth stations in this band.

81. SES noted that permitting higher power levels in rural and remote areas could constrain future deployments of FSS earth stations in the 4000-4200 MHz band due to potential adjacent band interference. SpaceX, in its reply comments, opposed higher maximum power levels in rural and remote areas to ensure new terrestrial deployments do not cause harmful interference to next-generation satellite users in the 4000-4200 MHz band, including for critical gateway earth stations and potential user terminals. It argued that higher maximum permissible power levels should not be adopted in rural and remote areas, as users are more likely to depend on comparably lower-power satellite user terminals to access high-speed, low-latency broadband services due to a lack of other comparable broadband options.
82. **Technical challenges with higher maximum power in rural or remote:** Although several respondents supported the use of higher power levels in rural and remote areas, some raised concerns about allowing different power levels in adjacent blocks or areas, citing potential interference from adjacent operations. Bell reiterated its concern related to having higher and lower power levels in adjacent blocks in the same areas and proposed that this could be alleviated by adopting appropriate out of channel emission levels and by assigning a portion of the band for higher power use and a different portion for low-power use.
83. Motorola was of the view that adjacent channel interference issues would likely not be a concern in less dense remote and rural areas.

Discussion

84. ISED has noted stakeholder views that the maximum permissible power levels should align with those in adjacent commercially licensed bands, as well as the alternative views presented.
85. The use cases requiring networks to operate over larger geographic areas in rural and remote regions could in general warrant a higher maximum power level. However, higher power levels present increased challenges with respect to interference mitigation between higher power systems and lower power systems. The corresponding reduced availability of frequencies could in turn reduce the areas available to new licensees. Therefore, ISED expects that higher permissible power in the context of NCL licensing would still be significantly lower than the levels permitted in commercial mobile bands. Specific values of the maximum permissible power levels will be established through the development of relevant technical rules and determined on a band-by-band basis.

86. The demand is expected to be greatest in metropolitan and urban areas since these areas tend to have higher population density and many businesses, warehouses, campuses, sports facilities, and entertainment venues where 5G services and applications would likely be deployed. In metropolitan and urban areas, ISED envisages targeted NCL licence areas corresponding to local networks operating on enterprise campuses. ISED does not agree with those stakeholders proposing higher power levels in all areas as ISED is of the view that higher power levels in metropolitan and urban areas will not allow for efficient coexistence amongst the NCL licensees in these targeted licensing areas. ISED is of the view that lower maximum power levels for NCL licensees relative to rural and remote areas will best fit the majority of the use cases for metropolitan and urban areas.
87. Permitting high-power operation in an adjacent area to lower power operation could result in challenges with respect to interference mitigation where the operations are at different power levels, even if the higher power levels are lower than the maximum permitted level in commercial mobile bands. ISED notes it could consider putting in place proactive measures noted by stakeholders to reduce the risk of interference. ISED will address measures to mitigate interference through the development of appropriate technical rules.

Decision

D3 Specific values of the maximum permissible power levels for NCL licensing will be established through the development of relevant technical rules on a band-by-band basis.

In general, maximum permissible power limits for NCL licensing will be lower than typical values allowed for other licensing frameworks (e.g. auctioned commercial mobile bands), unless otherwise specified.

In general, in rural and remote areas, ISED will permit higher maximum permissible power limits for NCL licensed operations than what would be permitted for NCL licensed operations in urban areas, unless otherwise specified.

5.2.3 Licence area boundary conditions

88. In the consultation, ISED sought comments on approaches to manage coexistence between NCL licensed operations. Specifically, ISED sought comments on managing interference between different NCL licensed operations by implementing a pfd at the licence area boundary. Further, ISED sought comments on an alternative approach where ISED could limit the deployment of base stations to a smaller area within the licence area without asking the prospective licensee to provide deployment details, but impose a pfd limit, if needed, to resolve potential disputes between licensees. ISED sought comments on how the specified base station deployment areas could be determined.

Summary of comments

89. **Implementing a power flux density at licence area boundary:** Several stakeholders including CanWISP, Celona, Ecotel, Motorola, NTT, RABC, RAC, Rogers, SES, Sogetel, TekSavvy, TELUS, and Xplore, generally supported the use of a pfd at the boundary of the licence area. Rogers argued that the use of a pfd limit would allow operators the most flexibility with regards to base station location, and that it is the most efficient method for optimizing spectrum use and making coexistence between systems achievable. Rogers emphasized that the onus should be on NCL licensees to prevent interference and not unduly constrain adjacent band commercial flexible use services. Motorola also proposed coordination between operators as an alternative to a pfd limit.
90. RABC and TELUS further recommended developing an additional licensing option based on an explicit pfd for medium-to-high-power systems to enable large coverage areas. This supplementary licensing option using a pfd limit would be compatible with the simple NCL licensing process that inherently prescribes an implicit pfd limit. TELUS added that these high- and medium-power class licences would have the same pfd boundary limits as low-power class licences but be explicit in the conditions of licence. The pfd limit could only be exceeded through coordination, and will require site-data up front when applying for an NCL licence area.
91. Qualcomm supported the use of a pfd limit for mmWave outdoor low-power NCL licences in urban areas and an alternate pfd limit for medium-to-high-power operations in combination with other mitigating measures in both urban and rural areas. In the 3900 MHz band, Qualcomm proposed adopting an adjacent channel leakage ratio requirement to facilitate coexistence between adjacent block high-power and low-power NCL licensed operations.
92. Bell and Xona opposed the pfd boundary condition proposal, as they believed that the pfd requirement would make deployments more demanding and difficult. Xona additionally noted that enterprises that do not have RF experience may require professional services, which will increase costs. Bell noted that while adhering to pfd limits to mitigate interference is a technically sound method, it can be challenging because complex modelling is required, and it reduces spectral efficiency by imposing strict conditions at the boundary that may require systems to operate at lower power levels. Instead, Bell suggested that the allowed power limits be such that the coverage is limited to the proposed licence areas with limited spill over beyond the licence area boundaries.
93. As an alternative approach, Dynamic Spectrum Alliance proposed using the [FCC's Part 96 rules](#) for Priority Access License (PAL) licence area boundary requirements if ISED moves forward with a manual NCL licensing approach.
94. ECOTEL proposed a dual concentric contour, which establishes two concentric vectors to define a licence area. A first one would be defined by a yet-to-be-determined certain level (3 dB for example) above the ambient thermal noise at an also yet-to-be-specified receiver height (30 m for example). This would constitute the worst-case interference scenario where

the base stations would interfere each other directly. A second vector, concentric to the first one, would be determined to allow adjacent use of the spectrum in the case of network synchronization. In this case, the tolerable noise rise would be calculated at the ground level.

95. CanWISP, Rogers, Sogetel and TELUS added that frame synchronization would additionally make coexistence between time-division duplexing (TDD) systems achievable. Some stakeholders proposed additional technical measures to manage interference between systems. Federated Wireless noted that additional restrictions, such as use of directional antennas or limitations on the amount of spectrum available for higher power deployments, may also assist to minimize interference with nearby lower power systems. SES, Sogetel and TELUS noted that the selection of antennas featuring higher discrimination using tilt would further improve coexistence between adjacent systems. SES suggested that certain methods can be used to improve coexistence, such as limiting the maximum gain of a base station toward the horizon.
96. Bell and RAC noted that the use of custom vector-based licences could allow for more accurate definitions of service areas and could serve as an interference mitigation strategy by allowing operators to focus power in the desired coverage area, and thus prevent higher power systems from interfering with lower power systems.
97. **Limiting deployment of base stations to specified areas:** CanWISP, Rogers, Sogetel and TekSavvy opposed the proposal for ISED to define specific base station deployment areas, as this would unnecessarily reduce potential deployments.
98. Rogers commented that although restricting base station deployment would be simpler, it would require guidelines that depend on frequency range as well as on type of environment.
99. Sogetel added that evolving capabilities of technology would require ISED to periodically update the base station deployment areas in order not to unduly restrict licensees.
100. Further, TekSavvy commented that limiting base station deployment areas would restrict the flexibility of network operators to configure their networks based on the terrain and required sectorization.
101. RABC and TELUS supported that a pfd applied at the licence area boundary should be the basis for determining a smaller area within a licence area for base station deployment for low-power licensees and/or licensees who do not have experience.

Discussion

102. The use of a pfd at the boundary of the NCL licence area, with the licensee potentially deploying anywhere within their licence area if they meet the pfd limit at the boundary, would allow operators the most flexibility regarding base station location. However, this would require the operator to determine compliance to the pfd limit and could be challenging for some non-traditional operators. Therefore, an alternate method to ensure that all operators meet the pfd limit, would be to have NCL licence applicants specify the base station's location and operating parameters at the time of application in order for ISED to assess that the applicant's base station does not exceed the pfd limit at the licence area boundary. Limiting the base station deployment areas within a portion of a licence area would also be challenging as it would require NCL licence applicants to plan their network prior to application in order to ensure that the base station deployment area is large enough to meet their needs, which could require significant technical expertise. Furthermore, ISED recognizes that restricting base station deployment within a portion of the licence area could constrain NCL licensees in optimizing their network deployment and could potentially hinder innovative use cases. ISED will therefore allow deployment of base stations in the entirety of the licence area. However, NCL licensees may not transmit to or receive from devices outside of their respective licence areas. Prospective licensees should therefore ensure that they understand their coverage requirements before applying. Although a pfd limit will not be imposed on NCL licences, ISED will, through an automated licensing system, take into account appropriate separation distances between NCL licensed areas to facilitate coexistence of NCL licensed operations by different licensees, as necessary.
103. ISED agrees with stakeholders that complementing the proposed measures with voluntary mitigation approaches such as higher antenna discrimination and network synchronization could be used to manage interference. ISED encourages parties to implement interference mitigation approaches including synchronization, where applicable. ISED will address synchronization on a band-by-band basis, where required, when it develops the technical rules.

Decisions

- D4** ISED will implement an automated licensing system such that appropriate separation distances between NCL licensed areas are taken into account to facilitate coexistence between NCL licensed operations by different licensees, as necessary.
- D5** NCL licensees may deploy base stations anywhere within their licence areas. However, they must not transmit to or receive from devices outside of their licence areas.

5.3 Measures to support local licensing

104. In the Consultation, ISED proposed a framework to provide operators and individual spectrum users with low-barrier access to spectrum that can facilitate the development of innovative technologies and applications that support communities, enterprise users, and industry verticals. ISED's intention is that the NCL licensing framework would support a variety of different use cases where the licensee would only need a spectrum licence that covers the area in which they intend to provide service while also allowing for gradual expansion of a network over time where needed.
105. Noting that the NCL licensing framework could be applied to multiple bands with differing characteristics in the future, ISED sought comments on the need to consult on measures such as spectrum limits, area limits, or limitations on the type of users on a band-by-band basis when applying the NCL licensing framework. ISED asked for feedback on the need for measures in urban and/or rural areas, and if there are other measures that could be implemented to limit the risk of foreclosure by larger operators to ensure that spectrum licensing remains localized, and that unused spectrum is accessible for a variety of users.

Summary of comments

106. Ecotel, Motorola and RAC expressed their support for ISED's proposed measures to support local access whereas Bell expressed that no additional measures are necessary. Many respondents indicated specific recommendations to the proposed measures. For example, Motorola proposed that in the 3900-3980 MHz band, a spectrum limit should be no more than 40 MHz in rural and remote areas and no more than 20 MHz in urban areas.
107. Sogetel and TELUS were in support of spectrum and area limits; however, TELUS proposed the implementation of design metrics for future assessment of the validity of retaining or removing such restrictions. CanWISP and TekSavvy proposed that if spectrum or area limits are implemented, they should not be used in rural areas, in order to support investment into broadband infrastructure in these communities.
108. ECN, Rogers, SES and Xplore expressed their support for considering additional measures to support local access on a band-by-band basis through consultation.
109. Regarding limiting the risk of foreclosure, BCBA, CanWISP and TekSavvy proposed that large national mobile service providers (NMSPs) and regional mobile service providers (RMSPs) must be excluded from the NCL licensing framework and should not be eligible to hold NCL licences. Similarly, TERAGO was in favour of excluding the main three large Canadian NMSPs (Bell, Rogers and TELUS) from accessing NCL licences. Sogetel proposed the delay of access for large operators to ensure licensing remains localized and that unused spectrum remains accessible for a variety of users. RAC also voiced that large block users should not be eligible for access to NCL licences.
110. Bell, Rogers and SaskTel rejected the proposal to exclude large operators and argued that ISED should not pre-emptively exclude any qualified Canadian organizations from the NCL licensing framework. Dynamic Spectrum Alliance proposed that ISED adopt "use or share

rules” to ensure that spectrum use is maximized and enables WISPs or smaller providers to access the resources necessary to ensure that rural/remote communities have access.

111. Bell, ECN, Rogers, SES and Xplore expressed their support for the potential differences between urban and rural use cases to be considered on a band-by-band basis through consultation. SaskTel recommended that ISED should continue to allow the existing and proposed licensing framework to gate the use cases and organizations involved.
112. CanWISP and TekSavvy argued that Tier 5 areas, rural or urban, should be identified as rural service areas to avoid loss of service and investment across Canada. However, in its reply comments, Rogers proposed that ISED reject CanWISP and TekSavvy’s Tier 5 identification request.

Discussion

113. Through local licensing, ISED aims to provide NCL licences only where an individual spectrum user intends to deploy its services relatively quickly, in order to avoid spectrum being reserved but not immediately used. This approach contrasts with other spectrum licensing frameworks (such as those that provide for an auction) that allow a licensee to build out a network over a given area over the deployment period set out in the framework. Those licensing frameworks will continue to be in place to support business models that favour gradual expansion of a network over time. However, NCL licensing will complement that approach by licensing an area with an immediate deployment need, to which additional areas may be requested over time as needs grow.
114. Also, in terms of area size, operators desiring larger licence areas should use spectrum in other bands that are designed around ISED’s tier system, ensuring that the “local” aspect of NCL licensing is not lost. As licence areas grow larger, the risk of overlap increases, so that demand for spectrum in overlapping areas could exceed supply and require an auction mechanism for licensing, which is not intended under NCL licensing.
115. ISED would be concerned if large operators foreclosed access to smaller providers, given that many smaller or private network operators may take time to make use of bands identified for NCL licensing due to their requirement to plan their networks and procure equipment.
116. ISED has considered implementing various measures to facilitate local access, such as small licence area sizes, lower power levels, fees and expeditious deployment requirements, with the aim of encouraging localized use and allowing multiple users in a given area.
117. In addition to the general licensing measures, if the NCL licensing regime is applied to a variety of bands in the future, there may be a need for additional restrictions to encourage access for a variety of users and use cases, and to deter spectrum warehousing. These restrictions could include area limits, either per application or cumulatively, limits on spectrum holdings, and limits on the type of user. These could be combined, made time-

limited, and/or adopted differently in rural and urban areas. Consideration of any such additional measures would form part of specific band consultations.

118. ISED recognizes that each band has unique characteristics and will have different demand dynamics throughout its use. In addition, technology changes can impact future use of bands with more efficient equipment or higher demand for larger bandwidths. As such, ISED will monitor the NCL licensing bands and may include further measures or modify or remove measures on bands in this Decision as well as for future NCL licensing bands, to adjust for changes in market dynamics, to improve spectrum efficiency, or to expand spectrum availability if necessary.

Decision

D6 ISED will apply measures to NCL licensing processes to support local access and limit foreclosure to ensure that NCL licensing remains localized, such as small licence area sizes, lower power levels, fees, and expeditious deployment requirements sufficient to ensure local use and access.

Additional measures to limit foreclosure of access, such as spectrum limits, area limits, eligibility limitations, or other measures will be considered on a band-by-band basis through consultation.

ISED will also consider measures to recognize the potential differences between urban and rural use cases on a band-by-band basis through consultation.

ISED may include further measures, modifications, or removal of measures on bands with established NCL licensing frameworks to adjust for changes in market dynamics, to improve spectrum efficiency, or to expand spectrum availability.

5.4 Conditions of licence

119. While the following conditions will apply to all NCL licences, it should be noted that licences are subject to the relevant provisions in the *Radiocommunication Act* and the *Radiocommunication Regulations*, as amended from time to time. For example, the Minister continues to have the power to amend the terms and conditions of NCL licences pursuant to paragraph 5(1)(b) of the *Radiocommunication Act*. The Minister may do so for a variety of reasons, including furtherance of the policy objectives related to the band. Such action would normally only be undertaken after consultation.

5.4.1 Licence terms

120. ISED sought comments on its proposed licence term of one year, with high expectation of renewal, for licences issued through the NCL licensing framework. Comments were also sought on the use of longer licence terms for rural and remote areas, if operators should be

allowed to acquire licences for less than one year, if there should be a minimum licence term, and if ISED should determine appropriate licence terms on a band-by-band basis.

Summary of comments

121. Bell, Ecotel, Rogers, SaskTel and TELUS supported ISED's proposed one-year licence term across the board, regardless of band or area. Bell commented that, due to the localized nature of NCL licences and the deployment plans that are required as part of the application process, a one-year licence term would be sufficient. Ecotel stated that a one-year licence term with high probability of renewal if the licence conditions are met would lead to predictable continuous access to the spectrum. Additionally, Rogers commented that a one-year term would allow the spectrum to become available to new licensees when the original licensee no longer needs it. SaskTel, while supporting a licence term of one year, suggested that ISED could also grant licences that are shorter than one year for event deployment to further promote efficient usage of spectrum. Bell, Rogers and Sogetel supported SaskTel's proposal.
122. Some stakeholders called for ISED to implement longer licence terms. Celona, FMCC, Dr. Gregory Taylor, NTT, Sogetel, Xona and Xplore supported longer licence terms in rural and remote areas. FMCC highlighted the potential for setbacks in establishing networks in rural areas and called for longer licence terms, such as three years, for Indigenous organizations and projects in order to promote spectrum deployment in the spirit of economic reconciliation. Xona stated that while a one-year term is appropriate in metropolitan and urban areas, fixed wireless access applications in rural and remote areas would require a licence term of at least three years for a viable business case. Similarly, Xplore called for ISED to grant longer licence terms to rural broadband providers that are seeking to implement a multi-year deployment plan. Sogetel stated that a one-year licence term would work but that they would not oppose a longer initial licence term in rural and remote areas. Celona and NTT supported a longer licence term for accommodating complex buildouts in both urban and rural areas.
123. CanWISP, MAC, ISOC-ICI-Mozilla and TekSavvy did not support a one-year licence term. CanWISP and TekSavvy recommend that ISED adopt a 20-year licence term for 3900 MHz NCL licences and a 10-year licence term for mmWave NCL licences so that they correspond to the current and proposed licence terms in the commercial bands. However, TekSavvy supported the availability of shorter licence terms for temporary networks. MAC requested a licence term in the range of 10 to 15 years to align with mining operational plans. Meanwhile, ISOC-ICI-Mozilla called for ISED to follow Ofcom's shared access licence model and implement indefinite licence terms.
124. Bell, Rogers and TELUS opposed longer licence terms in their reply comments. Bell stated that longer licence terms contradict the goal of NCL licences, which is to promote deployment in a short period of time. Rogers and TELUS shared Bell's perspective. In general, the three stakeholders argued that one year would be enough time for licensees in both urban and rural areas.

Discussion

125. Traditionally, authorizations on an FCFS basis are issued for one-year licence terms, expiring on March 31 every year. Licences are renewable upon payment of an annual licence fee, provided that the licensee is in good standing.
126. ISED reiterates that it intends to have NCL licences support localized use cases. Reserving spectrum over large geographic footprints over many years restricts access to others that may wish to use the spectrum in those areas immediately. To facilitate access for all operators, NCL licensed spectrum operators should only apply for specific areas they have plans to serve first and new adjacent licence areas over time. This enables the growth of networks without foreclosing access.
127. ISED recognizes that in rural and remote areas, longer licence terms may be desirable, to account for the additional time required for transportation of equipment to remote areas, and for the construction of supporting infrastructure. Another consideration for longer terms is the time needed for community consultation prior to construction. However, these considerations can be addressed through the deployment requirements for NCL licences as described in section 5.4.3.
128. While longer licence terms could provide additional time to complete community consultations, transport equipment and establish supporting infrastructure, ISED notes that these are initial tasks associated with using the licences that could be accommodated by relaxing the deadline for the initial demonstration of deployment.
129. In addition, while licence terms much longer than one year can provide business certainty and attract investment, they could also make spectrum access in NCL licensed bands less dynamic. As noted in section 5.1, ISED recognizes that there are new technologies and techniques (e.g. cognitive radio, dynamic spectrum access) being developed that will change the way spectrum is accessed. Should ISED evolve NCL licensing to dynamic spectrum access in the future, implementing annual or shorter licence terms allows for a relatively dynamic environment and serves as a stepping stone to more efficient spectrum sharing.
130. Further, on the topic of business certainty and investment, ISED proposed that licensees have a high expectation of renewal. This means that as long as the operator fulfills all of its conditions of licence, and there is no fundamental reallocation of spectrum by ISED or overriding policy need, licences would be renewed. ISED is cognizant that under an FCFS licensing approach, many land mobile radio and fixed services licensees have been renewing their licences annually for decades. This demonstrates that business certainty and investment returns can be realized with relatively short licence terms.
131. After consideration of the above factors, ISED has decided that NCL licences and licence renewals will be granted on a one-year basis. At the end of this term, the licensee would have a high expectation of licence renewal for a subsequent term unless a breach of licence condition has occurred, a fundamental reallocation of spectrum to a new service is required, or an overriding policy need arises.

132. Note that ISED will set the expiry dates of all renewable NCL licences so that they will all expire on March 31 of every year. This will make it simpler for licensees to organize their licences and will improve the management of these licences by ISED. Therefore, licensees may have an initial licence term of less than one year where the licence has been issued in the middle of the year. This is not to be confused with shorter (non-renewable) temporary licences as discussed below.
133. ISED recognizes that some use cases may lend themselves to shorter licence terms than a one-year term. Shorter terms may be beneficial for infrequent uses or time-limited events. For example, an operator may wish to add spectrum capacity for a few days or one week for an event that will have large crowds of participants. Alternatively, an operator may need spectrum on a regular basis but only once a month and would prefer shorter-term licences with prorated fees to lower business costs. The risk associated with very short-term licences is that spectrum may not be available in that area in the future if the operator releases the spectrum.
134. The ability to request shorter licence terms was well supported by stakeholders. ISED will support shorter terms for licences that will be issued on a temporary, non-renewable basis. These temporary NCL licences will be available for as little as one day to as much as 11 months in duration. However, the minimum prorated fee amount will be one month.
135. In the future, ISED may approach licence terms under the NCL licensing framework on a band-by-band basis. Additionally, ISED may modify its NCL licensing framework policy in the future to adapt to the developing sharing techniques, technologies, use cases, and evolving wireless environment.

Decisions

D7 Generally, renewable NCL licence terms will be granted for one year. Licence end/renewal dates will be aligned with March 31, which may result in initial terms being less than one year. At the end of the licence term, the licensee would have a high expectation of a licence renewal for a subsequent term unless a breach of licence condition has occurred, a fundamental reallocation of spectrum to a new service is required, or an overriding policy need arises.

D8 Non-renewable temporary NCL licences with terms of up to 11 months will also be available.

5.4.2 Eligibility

136. ISED sought comments on the eligibility requirements for licences issued through the NCL licensing framework.

137. Prior to obtaining a licence, ISED requires that applicants demonstrate that they meet the eligibility criteria as set out in subsection 9(1) of the *Radiocommunication Regulations*. ISED sought comments on this being the sole eligibility requirement for licences issued through the NCL licensing framework. Additional requirements or restrictions with regard to eligibility would be consulted upon prior to the release of specific spectrum bands, if necessary.

Summary of comments

138. Bell, Dynamic Spectrum Alliance, Rogers and TELUS agreed with ISED's proposed eligibility criteria and stated that there should be no eligibility restrictions that would prevent NMSPs from accessing NCL licensed spectrum. Dynamic Spectrum Alliance pointed out that allowing all operators to access NCL licensed spectrum would promote equipment ecosystem development and lower equipment prices, which would in turn put downward pressure on end user prices. Rogers supported Dynamic Spectrum Alliance's perspective and argued that allowing national operators to access NCL licensed spectrum would be in the best interests of all Canadian consumers and businesses. Furthermore, Bell argued that ISED should carefully review the proposed deployment plan of each NCL licence applicant in order to ensure efficient allocation of spectrum.

139. Sogetel, while not opposing NMSPs from accessing NCL licensed spectrum, nevertheless pointed out the risk of spectrum warehousing by NMSPs and other large corporations, and argued that these practices would stifle innovative activities of smaller spectrum licensees. Therefore, Sogetel called for ISED to develop further policies and regulations to protect smaller innovators in the NCL licensing framework.

140. CanWISP, Ecotel and TekSavvy opposed allowing NMSPs to access NCL licensed spectrum. CanWISP, TekSavvy, RAC, ISOC-ICI-Mozilla and BCBA argued that large mobile operators have the incentive to warehouse spectrum to the detriment of smaller mobile operators, and thus called on ISED to prohibit NMSPs and RMSPs from obtaining NCL licences. Similarly, Ecotel pointed out spectrum warehousing practices of large mobile operators and requested that ISED follow the proposal of Bundesnetzagentur, the German telecommunications regulator, to prohibit any public commercial network operator or its affiliates from accessing NCL licensed spectrum.

141. SaskTel requested that ISED include eligibility requirements to ensure that its customers' access to emergency services is not disrupted by NCL licensees. SaskTel further commented that NCL licensees should be registered with either ISED, the Canadian Radio-television and Telecommunications Commission (CRTC), or both, and with publicly available contact information, including emergency operations phone numbers. Furthermore, SaskTel suggested that ISED or NCL licensees should provide notification letters to their spectral neighbours to ensure proper awareness of spectrum usage, which would assist with maintaining the stability of network operations.

Discussion

142. Prior to obtaining a licence, ISED will require that applicants demonstrate that they meet the eligibility criteria as set out in subsection 9(1) of the *Radiocommunication Regulations*. Any additional requirements or restrictions with regard to eligibility will be consulted upon prior to the release of specific spectrum bands, if necessary.
143. ISED will monitor local licensing outcomes and may revisit the policy of the NCL general licensing framework, including the eligibility condition, if policy objectives (such as facilitating low-barrier access to spectrum to support the needs of new users, including private networks and industry verticals) are not being met.

Decisions

D9 ISED will require that all NCL licence applicants demonstrate that they meet the eligibility criteria as set out in subsection 9(1) of the *Radiocommunication Regulations*.

D10 Any further restrictions on eligibility will be consulted upon on a band-by-band basis.

5.4.3 Deployment requirements

144. ISED sought comments on its proposal to set deployment requirements for licences issued through the NCL licensing framework.
145. In addition, comments were sought on the methodology for demonstrating deployment. ISED proposed a simple demonstration of deployment (a “yes/no” system) to meet the condition of licence. ISED also asked if there should be a minimum site requirement to ensure that requests for licence areas remain targeted and, if so, what would be an appropriate number of sites per unit of area.
146. ISED sought comments on how deployment should be demonstrated, through one or more of the following options:
- Option A: an attestation
 - Option B: the provision of evidence that the authorized sites have been deployed
 - Option C: other approaches or a combination of approaches
147. The timing of when deployment must be active and cover the licence area was also discussed, as well as additional strategies if one-year licence terms are adopted:
- If licences are for one-year terms, should some deployment requirements only need to be met in a subsequent term, when the licence is renewed?
 - In rural and remote areas, should deployment requirements be phased (e.g. two or three years after the licence is issued)?

Summary of comments

148. **Setting deployment requirements:** AEM, Bell, CanWISP, Ecotel, ECN, Federated Wireless, Dr. Gregory Taylor, Meta, Motorola, Qualcomm, RAC, Rogers, SES, TekSavvy, TELUS and Xona supported ISED’s proposal of setting deployment requirements for licences issued through the NCL licensing framework. CanWISP, Ecotel, Meta, Qualcomm, RAC and TekSavvy concurred with ISED that deployment requirements would encourage licensees to put the spectrum to use in a timely manner and deter the practice of spectrum warehousing. Specifically, Ecotel and Qualcomm recommended that ISED follow a “use-it-or-lose-it” principle in setting deployment requirements. CanWISP and TekSavvy further urged deployment requirements of NCL licences to be stringent. Rogers also stated that deployment requirements should be strong and implemented quickly enough to encourage timely spectrum usage.
149. **Deployment requirement methodology:** Many respondents did not specifically comment on the use of a “yes/no” system. Regarding the setting of deployment requirements as a “yes/no” system, support was explicitly expressed by Dr. Gregory Taylor and ISOC-ICI-Mozilla. TELUS noted that at a minimum, ISED should validate deployment.
150. CanWISP and TekSavvy preferred an approach based on population coverage. However, they would not be against a site-based approach and proposed a set of minimum site requirements based on the licence size, type of Tier 5 service area, and band level. Qualcomm supported a minimum site requirement but did not provide any specific targets. Bell disagreed with ISED setting any deployment targets such as a minimum number of sites, stating that such targets would improperly interfere with normal market functioning.
151. **Demonstration of deployment requirements:** Respondents were split on their recommendations among ISED’s three proposed options for demonstrating deployment requirements.
152. Bell, CanWISP, Motorola, Rogers and TekSavvy supported Option A, an attestation. Bell stated that requiring a simple attestation would align with ISED’s goal of reducing administrative burden. CanWISP and TekSavvy argued that the upload of station data would be sufficient for licensees to demonstrate that they have met the deployment requirements as the mechanism is straightforward and well established. However, should ISED require further documentation to demonstrate the meeting of deployment requirements, CanWISP and TekSavvy would support a simple attestation.
153. Dynamic Spectrum Alliance, Ecotel, Federated Wireless, RAC and SES supported Option B, the provision of evidence that the authorized sites have been deployed. RAC called for licensees to provide technical evidence to demonstrate deployment. Dynamic Spectrum Alliance and Federated Wireless supported requiring licensees to provide additional operational information as proof of deployment. Federated Wireless further recommended that ISED employ the automation tools that Federated Wireless has developed for the UK’s FCFS process to facilitate the collection of licence information.

154. Dr. Gregory Taylor, ISOC-ICI-Mozilla and Qualcomm supported Option C (a combination of approaches) in different ways. Dr. Gregory Taylor and Qualcomm recommended that ISED require licensees to submit both an attestation and additional evidence of deployment, with Qualcomm suggesting additional evidence such as the location of sites, date of actual construction, operating frequencies, and date of service commencement. ISOC-ICI-Mozilla supported either Option A or Option B based on the supply and demand of NCL licences. ISOC-ICI-Mozilla argued that Option A would be sufficient if demand does not exceed supply while Option B should be required if demand exceeds supply.
155. TELUS supported ISED validating deployment but stated that the site data requirement for determining coexistence would be sufficient to demonstrate deployment and did not have a preference as to ISED's proposed options.
156. **Timeline of deployment requirements:** Responding to the question about the deployment timeline, Rogers and Xplore called for deployment requirements to be met by the end of a one-year licence term. Rogers argued that, even considering weather conditions, one year would be sufficient for licensees to demonstrate deployment in both urban and rural/remote areas, and that operators should only apply for a licence for sites where they are able to meet deployment requirements.
157. Celona, Motorola, NTT and Qualcomm, while stating that deployment requirements could be met by the end of one year in some cases, argued that there are certain circumstances that could prevent licensees from meeting deployment requirements within one year. Motorola urged ISED to grant extensions to the deployment timeline when issues beyond the licensee's control, such as weather and equipment delays, interfere with deployment plans, provided that the licensee submits documentation to warrant such extension. Celona, NTT and Qualcomm suggested that ISED extend the deployment timeline for complex and large-scale network buildouts. TELUS did not offer specific comments on deployment requirements, but recommended deployment requirements be met at the end of the licence term prior to renewal, regardless of the length of the licence.
158. Sogetel called for ISED to implement a grace period for deployment requirements over the first few terms of a licence such that licensees have enough time for site investment. Echoing Sogetel's comments, CanWISP and TekSavvy proposed that deployment requirements take effect one year following licence approval. Furthermore, they called for an initial exception of two years for WBS operators to fully transition their systems to the 3900 MHz band, and an additional exception of two years for licence applications in support of grant funding applications.
159. Several stakeholders, including ECN, Ecotel, RAC and Sogetel, called for a longer deployment timeline in rural and remote areas. Ecotel and ECN pointed out that the time needed for new tower constructions might prevent licensees from fully meeting the deployment requirement within one year. Ecotel and FMCC preferred a phased approach in

rural and remote areas, with FMCC specifically recommending a phased approach over at least three years in rural and remote areas. However, CanWISP and TekSavvy mentioned that in rural and remote areas, a longer deployment time frame than what they have proposed is not needed.

160. Sogetel mentioned that the site acquisition and permit approval process has become lengthier in areas with a high population density, which ISED should take into consideration when setting and enforcing deployment requirement timelines. Additionally, CanWISP suggested that when a complicated project is planned, ISED should make it clear that not everything must be built by the time the deployment requirement is enforced.

Discussion

161. **Setting deployment requirements:** ISED uses deployment requirements to encourage licensees to put spectrum to use to provide wireless service in Canada in each service area and verifies compliance with them at specific times throughout the licence term. The inclusion of a deployment requirement as a condition of licence was well supported by stakeholders. ISED maintains the view that deployment requirements support the objective of facilitating deployment and timely availability of services across the country, including rural areas, so that all Canadians can have high-quality services at affordable prices. As such, NCL licences will have a deployment requirement included in the conditions of licence.
162. Since spectrum licence areas will be defined by a custom vector (see section 5.2.1), it is expected that licensees only request licences for the area they intend to cover. ISED may request documentation at any time from licensees which demonstrates that the entire licence area is being served.
163. **Deployment requirement methodology:** ISED acknowledges that the traditional population-based conditions used for spectrum licences may not be appropriate for the type of local access and use cases for which the NCL licensing framework is designed.
164. In addition, ISED is also seeking to automate some of its processes to streamline and support NCL licensing. To this end, and to reduce the administrative burden of verification for both ISED and licensees, ISED proposed a simple demonstration of deployment as a condition of licence. This was referred to as a “yes/no” system of deployment requirements. There was support for this in stakeholder comments with few alternative proposals being raised.
165. An additional option that was noted as a possibility by ISED was to have a minimum number of sites required per unit of area. This would avoid a situation where an operator requests a large area and activates a single site, thus satisfying the yes/no deployment requirement but not truly serving the entire area. This was not heavily commented on by stakeholders but may be a consideration for specific bands. However, for the purposes of simplicity and automation, the minimum sites per unit of area will not form part of the

general NCL licensing framework. Further strategies can be considered on a band-by-band basis in the future to mitigate deployment risks.

166. As part of the general NCL licensing framework, ISED will implement a simple “yes/no” system to determine if a licensee has met its deployment requirements. This will streamline NCL licensing and support automation of its processes. The “yes/no” system will be based on a licensee demonstrating deployment, in accordance with the conditions of licence. ISED may consult on additional deployment requirements on a band-by-band basis.
167. **Demonstration of deployment:** Comments on the method of communicating/demonstrating deployment to ISED were mixed. Some stakeholders supported an attestation while some supported the provision of evidence of deployment. Those supporting a different method mainly referred to a combination of the two noted options or using one or the other in different circumstances. Therefore, the discussion can be limited to the two options or a mix thereof.
168. For clarity, ISED considers the “provision of evidence of deployment” to be satisfied by the data shared with the ISED through the monthly site uploads with which existing operators are familiar.
169. While some stakeholders supported an attestation due to its simplicity, ISED notes that monthly site data uploads will be required in NCL licensed bands (see section 5.4.5). As this is the case, requiring an attestation in addition to site uploads would be an additional, requirement that may unnecessarily increase administrative burden.
170. Using site upload information to check deployment will allow ISED to use an automated system to verify deployment. In addition, using site data upload information that is updated on a regular basis will provide a clearer picture of current deployment and any changes that may occur, as compared to a one-time or annual attestation.
171. Therefore, compliance with deployment requirements will be confirmed by ISED through the site data upload system. ISED may also request additional documentation to ensure that the spectrum is being used to fullest extent in the NCL licence area.
172. **Time frame to meet deployment requirements for new NCL licences:** Given that the intent of the NCL licensing framework is that applicants only request access to areas they intend to serve in the near term, ISED expects licensees to be able to demonstrate their deployment relatively quickly once they have received a licence. Noting international local licensing precedents as a frame of reference, full deployment in other countries is often required within six months to one year.
173. However, ISED recognizes that the time frame of six months to one year is likely too short in rural or remote areas to transport equipment and build required infrastructure. Community consultation for infrastructure installation in both urban and rural areas may also increase the time required for deployment. These factors may impede the ability of some operators to fully deploy within one year of licence issuance.

174. While renewable licences will be one year in length, ISED will allow new NCL licensees two years (from the initial effective date of the licence) to demonstrate deployment to all of their licence area, in all Tier 5 service area classifications (metropolitan/urban/rural/remote). Following this, deployment must be maintained by the licensee for the balance of the relevant term and throughout any terms of licences issued through renewals. ISED may ask for confirmation of deployment at any time and will require verification in order for licences to be renewed.
175. ISED notes that only stations that are actively used for radiocommunication (as defined in the *Radiocommunication Act*) will be considered as valid deployments for the purposes of demonstrating compliance with this requirement.
176. Based on their shorter time frames and the fact that they are not renewable, temporary NCL licences will not be subject to deployment requirements.

Decisions

- D11** ISED is adopting a simple demonstration of deployment (a “yes/no” system) to meet the condition of licence on deployment. This will be confirmed through site data uploads.
- D12** All licensees with renewable NCL licences will be required to demonstrate deployment to all of their licence area within two years of the initial effective date of the licence, and on an ongoing basis thereafter. Only stations actively used for radiocommunication (as defined in the *Radiocommunication Act*) will be considered as valid deployments for the purposes of meeting this condition.
- D13** Temporary NCL licences will not be subject to deployment requirements.

5.4.4 Divisibility, transfers and subordinations

177. ISED sought comments on the proposal that licences issued through the proposed NCL licensing framework will not be granted divisibility, transfer or subordination privileges.

Summary of comments

178. Bell, ECN, Dr. Gregory Taylor, Meta, ISOC-ICI-Mozilla, Rogers, Xona and Xplore supported ISED’s proposal to not allow divisibility, transfer or subordination of licences under the NCL licensing framework. Bell and Rogers noted the unique properties of NCL licences, such as their non-competitive nature, and argued that allowing spectrum transfers would create opportunities for speculation or arbitrage. ISOC-ICI-Mozilla suggested that rather than allowing licence divisibility, transfer, or subordination, ISED should allow licences that are no longer being used to expire and be eligible for re-application. Ecotel also warned against licence transfers but did not comment on licence divisibility or

subordination. Sogetel noted the characteristics of NCL licences and supported a prohibition on licence subordination.

179. Celona, Motorola and NTT proposed that ISED allow licence subordination. CanWISP, Sogetel, TekSavvy and TELUS supported licence transfers in certain cases, such as in the case of ownership changes. CanWISP argued that stringent deployment requirements on NCL licences would be sufficient to deter purely speculative spectrum acquisition. Furthermore, CanWISP submitted that the ability to sell a business in the future, if required, is crucial to the business plans of independent service providers and is dependent on the ability to transfer licences. TELUS concurred with Bell and Rogers' concern regarding speculative transfers; however, it supported transfer applications that included deployment plans to the benefit of Canadian consumers and businesses.

Discussion

180. A key principle of ISED's proposed NCL licensing framework is targeted licensing, where operators are only issued licences for the specific areas and bandwidth that they need for the amount of time that they need them. When a licensee is no longer actively using the service or has not met its deployment requirements, the licence should be returned, not renewed, or revoked so that others may use the spectrum.
181. Spectrum serves Canadians when it is put to use, while arbitrage activities and speculation do not advance ISED's policy objectives. As discussed in section 5.2, NCL licensees are strongly encouraged to request a licence that only covers an area where they are intending to provide services. ISED does not condone speculating on licences in order to hold them for later financial arrangements. NCL licences are intended to be available for those who are in need of spectrum for operating their business and ISED will require that the licences be returned when no longer in use. As such, ISED will not allow NCL licences to be transferred, divided, or subordinated.
182. ISED is aware that changes in effective control of a licence can occur when changes are made to the ownership or control of the licensee. For many licences, ISED has restricted these changes in ownership and/or control (known as "deemed transfers") via conditions of licence. However, based on the localized nature of NCL and the expectation that NCL licensees will represent diverse and varied industries, ISED is not of the view that similar restrictions are necessary for NCL licences. Eligibility requirements, measures to support local licensing, and all other conditions of licence will continue to apply to the licence and licensee. For further clarity, ISED notes that the transfer provisions set out in section 5.6 of CPC-2-1-23, [*Licensing Procedure for Spectrum Licences for Terrestrial Services*](#) will not apply to NCL licences.

Decision

D14 As a general rule, ISED will not allow the division, transfer, or subordination of licences issued through the NCL licensing framework but will not restrict changes in ownership and control of NCL licences. In the event of a change in ownership and control, eligibility requirements and all other conditions of licence will continue to apply to the licensee.

5.4.5 Data requirements

183. In the Consultation, ISED sought comments on establishing a condition of licence for NCL licensees to provide site data information relating to the radiocommunication installations associated with the licence.

Summary of comments

184. Stakeholders including Bell, CanWISP, Dynamic Spectrum Alliance, Ecotel, Federated Wireless, Motorola, Qualcomm, RABC, Rogers, Sogetel, SpaceX, TekSavvy, TELUS and Xplore, supported ISED's proposal to establish a condition of licence for NCL licensees to provide site data information.

185. Several stakeholders commented on the benefits of a site data requirement. Bell and TELUS stated that licensees should be required to provide site data on a regular basis, which would support ISED in the spectrum licensing process. Dynamic Spectrum Alliance and Federated Wireless also commented that access to site data would facilitate ISED's management of the spectrum band. Motorola argued that detailed site data would be critical in determining and preventing interference, as well as coordinating future deployment of nearby systems. Xplore mentioned that site data information is important for ISED to monitor compliance with deployment requirements.

186. Rogers supported ISED in establishing a condition of licence for NCL licensees to provide site data information relating to the radiocommunication installations associated with the licence. Rogers found it essential for operators to provide accurate and timely site data information to ensure coexistence with NCL licensees and adjacent services. SpaceX supported Rogers' proposal. Furthermore, Rogers called for ISED to closely enforce the condition of licence such that the site data that the licensees provide is complete and accurate.

187. Motorola and SpaceX commented on the specific requirements of site data to be submitted by licensees. Motorola requested that site data should include information on antenna heights, gains, pointing angles, beamwidths, utilized EIRP levels, among other aspects. SpaceX recommended that ISED require terrestrial operators to submit all antenna parameters and deployment details that would be necessary to conduct an automated interference analysis between terrestrial operators and satellite gateway earth stations.

188. RABC suggested users should only have to provide site data information once. CanWISP and TekSavvy did not support a requirement for applicants to provide station data during the application process or prior to deployment. However, the two stakeholders supported requiring NCL licensees to provide site data information in a manner similar to the current station data upload required for all spectrum licences and stated that the data should be publicly available.
189. Meta was the sole stakeholder to completely oppose the site data requirement, arguing that such a requirement would put an unnecessary regulatory burden on NCL licensees.

Discussion

190. As decided in section 5.2, ISED will be adopting a custom vector-based approach. Under this approach, an NCL licensee may deploy base stations and user terminals anywhere within its licence area. An automated tool will be used at the time of application to ensure adequate separation distances between NCL licensed areas to allow for future base stations and user terminal deployments. Detailed technical site data (e.g. geographical location of the site) will not be required at the time of application. This will make the application process under a custom vector-based approach simpler for newer spectrum users.
191. Although detailed site data will not be required with the application, licensees will be required to supply site information to ISED through the regular site upload process as sites are deployed or modified. Timely and accurate site uploads are required to ensure that pertinent information is available for review of deployment at time of renewal, and to assist other licensees with planning and interference management.
192. On March 10, 2022, ISED published the [*Consultation on Amendments to Requirements for Spectrum Licensees to Submit Technical Information about Sites*](#), which proposed a number of amendments to the elements required, reporting requirements, and related conditions of licence. A decision based on this consultation is expected to be released before any NCL licences will be issued.
193. The new site data requirements and associated conditions of licence are expected to apply to all terrestrial spectrum licences, including those for NCL licensing.
194. All relevant site data related to NCL licences will be publicly available as per ISED's new site reporting database. Entities that provide services that require confidentiality of their station characteristics or locations should not seek NCL licences.

Decision

D15 All NCL licences will have a condition of licence requiring site data uploads. Exact requirements and associated conditions of licence will be set out in a decision relating to the *Consultation on Amendments to Requirements for Spectrum Licensees to Submit Technical Information about Sites*. That decision is expected to be released in the future, ahead of any issuance of NCL licences.

ISED will monitor developments in the collection of site data as it relates to NCL licences and may choose to adjust upload requirements in the future.

5.4.6 Other conditions of licence

195. ISED sought comments on the other proposed conditions of licence for licences issued through the NCL licensing framework, covering radio station installations, technical considerations, and international and domestic coordination, lawful interception, and reporting requirements.

Summary of comments

196. Bell, CanWISP, Ecotel and TekSavvy supported the remaining proposed conditions of licence in annex A of the Consultation.

197. Motorola and SaskTel accepted the proposed conditions of licence with certain exceptions. Motorola supported a licence term of six years following the confirmation of construction and the removal of the lawful intercept condition for NCL licensees that provide services to specialized users, such as business, industrial and critical communications, or those that are used for private, internal communications. SaskTel requested that ISED include in the conditions of licence an obligation for NCL licensees to turn down or turn off their spectrum broadcasting equipment and operations where network interference remains unresolved for a period of more than two hours, arguing that such a condition is necessary to pre-emptively manage interference concerns.

Discussion

198. Few comments were received regarding the other conditions of licence and as noted above, they were generally in support of ISED's proposals.

199. Depending on the eligibility criteria for NCL licensing in a certain band, telecommunications common carriers may also be applying for NCL licences. Therefore, antenna tower and site sharing, as well as mandatory roaming will be included in the conditions of licence, as well as the lawful intercept requirement. Only those licensees operating as telecommunications common carriers will be required to respect these conditions of licence.

200. To provide clarity to those potential applicants that are new to spectrum management, the current definition of a telecommunications common carrier, as per the *Telecommunications Act*, is: a person who owns or operates a transmission facility used by that person or another person to provide telecommunications services to the public for compensation. The provisions regarding mandatory tower sharing in CPC-2-0-17, [*Conditions of Licence for Mandatory Roaming and Antenna Tower and Site Sharing and to Prohibit Exclusive Site Arrangements*](#) only apply to telecommunications common carriers.
201. The conditions of licence listed in annex A will form the basis to establish licence conditions for spectrum licences made available for NCL licensing. Modifications to licence conditions may be made for any given band released for such use and established through consultation prior to the release of new NCL licensed spectrum. Note that some conditions may not apply to all licensees or use cases. Where the conditions of licence established for any given band vary from those set out in annex A, the specific conditions established for the band in question will prevail.

Decision

D16 The conditions of licence contained in annex A will form the basis of the general NCL licensing framework, but may be modified and expanded on a band-by-band basis through consultation, as required.

5.5 Technical considerations

202. This section discusses the technical considerations for NCL licensed operations.

5.5.1 Indoor versus outdoor NCL licensed operations

203. ISED sought comments on whether a distinction should be made between indoor and outdoor usage in NCL licensing bands so that different operators in the same overlapping area could be licensed on the same frequency block. As well, ISED sought comments on whether different technical rules should be applied based on indoor or outdoor operation and what interference mitigation measures should be implemented to enable their coexistence in such a scenario.
204. ISED sought comments on the general interference mitigation measures that could be implemented to enable band sharing should it decide to allow NCL licensed indoor and outdoor licensing to different operators in a band shared with other radiocommunication services.

Summary of comments

205. **Distinction between indoor and outdoor:** Dynamic Spectrum Alliance, Federated Wireless, Motorola and SES supported distinguishing between indoor and outdoor usage of

NCL licences in all bands, as well as allowing geographical overlap with different indoor and outdoor operators within the same frequency band.

206. Motorola and SES noted that the type of technical rules and interference mitigation measures required would be different when the equipment is indoor versus outdoor as it will have a great impact on the interference environment. Motorola added that specific interference mitigation measures for indoor operations (e.g. power levels similar to indoor Wi-Fi, should be implemented for indoor systems operating in the 3900 MHz band). Dynamic Spectrum Alliance and Federated Wireless noted that dynamic spectrum access systems are able to distinguish between indoor and outdoor licences and are capable of frequency reuse and proposed that ISED leverage dynamic spectrum access systems to manage coexistence, avoid interference and maximize spectrum efficiency.
207. Meta suggested that power levels may differ between indoor and outdoor operations. For instance, outdoor power levels could be reduced to avoid interference with indoor networks.
208. Qualcomm commented that separate indoor and outdoor licensing rules would create additional technical complexity, particularly for the 3900 MHz band. However, if ISED were to allow unaffiliated entities to hold separate indoor and outdoor 3900 MHz NCL licences covering the same licence area, Qualcomm recommended that only low-power indoor operations be permitted. Qualcomm commented that indoor operations should not have to operate at reduced power in mmWave bands due to the propagation characteristics in those bands.
209. CanWISP, Ecotel and TekSavvy supported distinguishing between indoor and outdoor NCL licences in the mmWave band only, as the higher building penetration loss in mmWave bands between indoor and outdoor NCL licensees would maximize spectrum efficiency. CanWISP and TekSavvy also recommended that licensees be permitted to hold combined indoor/outdoor licences, particularly in metropolitan Tier 5 service areas where mmWave deployment is likely to span both indoor and outdoor spaces.
210. Bell, Rogers, Sogetel and TELUS did not support distinguishing between indoor and outdoor NCL licences or allowing geographical overlap. They believe that it is too early to make a distinction between indoor and outdoor licensing conditions as the equipment ecosystem is still in the very early stages of development and noted that making a distinction at this stage could unnecessarily complicate coexistence rules. These stakeholders proposed that ISED only make the distinction if there is enough demand for the indoor and outdoor licences to justify it. In its reply comments, Bell reiterated its view originally presented in its comments.
211. **Interference mitigation measures between co-located indoor/outdoor operations:** Motorola and Qualcomm suggested using band partitioning wherever possible for each operator or potentially further reducing the power levels for indoor operations. RABC, CanWISP, Qualcomm and TekSavvy noted that network synchronization is critical for TDD networks to facilitate the usage of shared spectrum both in outdoor and indoor operations.

212. RABC further highlighted that the operation of unsynchronized TDD systems would require enhanced isolation across operators (NCL licensees and spectrum licensees in adjacent spectrum) to reduce the risk of interference. Isolation across unsynchronized TDD systems can be achieved through the restriction of usage of spectrum blocks (e.g. restricted blocks, guard bands), additional filtering on the equipment's operating in the band or by stringent site coordination among network operators for efficient usage of the spectrum. RABC recommended that ISED enforce common synchronization of TDD for applicants of the automated licensing process. Alternately, RABC noted that if radio system operators are of the opinion that TDD synchronization would not be worth the added complexity on network design and equipment availability, ISED could allow licensees to elect for a non-standard TDD synchronization format and accept the technical limits associated with the -6 dB I/N protection criterion for in-band and adjacent band services whether for outdoor or indoor operations. TELUS supported RABC's proposal.

Discussion

213. **Distinction between indoor and outdoor:** ISED notes that some stakeholders supported distinguishing between indoor and outdoor usage of NCL licences in all bands. Some stakeholders supported distinction only in bands where there is a higher propagation loss of signals, which could allow a geographical overlap of indoor and outdoor licences with a low risk of interference. ISED will determine on a band-by-band basis whether to allow NCL indoor and outdoor co-channel licensing to different licensees in the same geographical area.
214. Permitting indoor and outdoor NCL licensing in the same spectrum frequency blocks in the same area may require a distinction to be made in terms of the type of equipment used in the two cases, such as requiring ruggedized enclosures for outdoor equipment. Such a distinction would prevent indoor NCL licensed operations to be expanded outdoors. However, as some of the stakeholders noted, making a distinction in the type of equipment to be used in the two cases could impact equipment availability to meet Canadian standards. ISED will take into consideration the availability of equipment when developing technical rules in relation to indoor versus outdoor NCL licensing.
215. ISED recognizes that a distinction between indoor versus outdoor deployment would allow for the closer licensing of neighbouring NCL licence areas. As such, ISED will be requesting NCL licence applicants to indicate whether they will be deploying antennas indoor versus outdoor.
216. **Interference mitigation measures between co-located indoor/outdoor operations:** ISED acknowledges that permitting indoor and outdoor NCL licensing in the same frequency blocks in the same area could result in challenges with respect to coexistence and interference mitigation if the indoor and outdoor transmissions cannot be sufficiently protected from each other to prevent interference.

217. Indoor and outdoor licensing to different operators in the same frequency blocks and the same geographic area could be feasible in the higher frequency bands where the propagation losses and the building penetration loss combined with appropriate technical rules could allow the coexistence of these services. ISED has noted the interference mitigation measures of synchronization, coordination between licensees and the use of a dynamic spectrum access system proposed by stakeholders. ISED will take these into consideration in the process of developing its technical rules for the respective bands. ISED does not intend to broadly impose synchronization requirements for all NCL licence bands but will make a determination on this matter while developing the technical rules on a band-by-band basis.
218. ISED notes that stakeholders did not provide comments on proposals to mitigate interference with other radiocommunication services operating in the same or adjacent NCL licensing bands.

Decisions

- D17** ISED will determine on a band-by-band basis whether to allow co-channel NCL licensed indoor and outdoor licensing to different licensees in the same area.
- D18** ISED will take into account equipment availability when establishing the technical rules for NCL licensed systems.
- D19** ISED will determine on a band-by-band basis what interference mitigation measures may be needed to address coexistence of indoor and outdoor NCL licensing operations in the same frequency blocks in the same area.

5.5.2 Automated technical coexistence analyses

219. ISED sought comments on its proposal to manage access to the NCL licensed bands and to conduct coexistence analyses through an automated licensing process for NCL licensed operations.
220. ISED also sought comments on whether there is a need to provide additional feedback on applications that are rejected due to interference concerns, such as possible modifications to submitted technical parameters that could enable access to the band, as part of the licensing process.
221. ISED sought comments on its proposal to not mandate specific technology solutions (e.g. TDD synchronization between systems) to address interference issues, but to instead set technical rules to facilitate coexistence.

Summary of comments

222. **Coexistence analyses through automated licensing process and need for feedback on rejected applications:** Bell, CanWISP, Dynamic Spectrum Alliance, ECN, Ecotel, Federated Wireless, Meta, Motorola, Qualcomm, Rogers, SES, Sogetel, TekSavvy, TELUS and Xplore all supported ISED's proposal to manage access to the NCL licensed bands and to conduct coexistence analysis through an automated licensing process for NCL licensed operations.
223. However, stakeholders provided various comments on how to improve the automated licensing process.
224. CanWISP, Sogetel and TekSavvy suggested that the automated licensing system should provide the option of negotiated agreements before asking for the parameters, as this could allow for more deployments or cooperation.
225. According to RABC and Qualcomm, a centralized automated licensing model that uses only one set of technical requirements for each frequency band and geography (3.9 GHz indoor/outdoor in urban areas, mmWave indoor/outdoor in urban areas, and operations in rural and unserved areas) may help streamline and simplify coexistence issues. If an applicant fails the automated process, then RABC recommended a supplemental step where the applicant could accept a more restrictive condition of licence for ISED to issue an NCL licence to the applicant. Bell, Qualcomm, Rogers, TELUS and Xplore supported RABC's modified automated application process.
226. Bell, CanWISP, SES, Sogetel and TekSavvy commented that during the application process, the automated system should identify potentially problematic parameters that could cause a rejection in the application. It should also provide feedback to applicants whose application has been rejected. Ecotel noted a similar concern and suggested that the final decision on spectrum allocation should not be in the sole hands of an automated system. Rather, the applicant should have the option of appealing the potential "automated refusal" to ISED by bringing tangible facts to support the case. Qualcomm also supported an appeal process or an additional manual process to address any deficiencies identified by the automated system.
227. Federated Wireless recommended the use of the automation tools that they have developed to facilitate coexistence and expedite the analysis needed to avoid interference. Dynamic Spectrum Alliance and Federated Wireless supported a dynamic spectrum access-enabled licensing process as applicants would be able to identify ahead of time whether interference concerns would arise and adjust licence applications accordingly. Federated Wireless pointed out that the use of a dynamic spectrum access system to manage intra- and inter-band interference in the 3900 MHz could facilitate coexistence at higher power levels in rural and remote areas since such a system can take into account different deployment models and use cases, including between higher and lower power operations.

228. Motorola recommended requiring the use of manual coordination when necessary for licensees in overlapping operating areas to ensure coexistence between different licensees. Motorola further commented that licensees could be warned if potential adjacent channel interference issues may come up from nearby deployments where adjacent channel interference ratios exceed 30 dB. This would allow an operator to take additional steps to improve the interference situation.
229. Bell, ECN, Qualcomm, RABC, Rogers, SES, Sogetel, TELUS and Xplore agreed that ISED should offer details about why an application was rejected by default. SES viewed that ISED's proposed additional feedback mechanism could be used to effectively manage interference between FSS and the mobile service near the boundary with NCL licensees. CanWISP, Sogetel, Motorola and TekSavvy stated that by providing information from an automated coexistence analysis, ISED could empower users to work together to coordinate coexistence. CanWISP and TekSavvy agreed that when investigating a potential interference case, a co-channel or adjacent-block NCL licensee should be able to discover what stations in adjacent blocks or adjacent licence areas may exceed the boundary conditions. The operator that is experiencing interference would then be able to contact the operator that may be causing the interference, and request coordination. In its reply comments, Rogers recommended that prospective NCL licensees provide accurate site data and to immediately notify ISED of any modifications and update the Spectrum Management System database.
230. CanWISP and TekSavvy further commented that licences for the same frequency range should generally not overlap geographically. Information regarding existing licence frequency blocks and licence areas should be available to applicants so they can use the information to suitably modify their application to avoid rejection. CanWISP, RABC, Sogetel and TekSavvy added that ISED should offer possible modifications to meet compliance with coexistence requirements upon request, noting that new spectrum users may require additional assistance to deploy coexistence compliant systems. However, TELUS stated that ISED should not be obliged to propose potential mitigation measures to applicants.
231. Bell and Motorola commented on the ease of use of the automated system, noting that applicants should only be required to enter the appropriate information into the system once.
232. **Not mandating specific technology:** Most respondents, including CanWISP, Ecotel, ECN, Qualcomm, RABC, Rogers, Sogetel, TekSavvy, TELUS and Xplore, supported ISED's proposal not to mandate specific technology solutions (e.g. TDD synchronization between systems for unpaired NCL licensed bands) to address interference issues, but to instead set technical rules to facilitate coexistence.
233. Qualcomm, RABC, Rogers, TELUS and Xplore explained that mechanisms to optimize the use of spectrum such as TDD synchronization for unpaired NCL licensed bands, while not being made mandatory, should be encouraged. RABC, TELUS and Xplore suggested that a common TDD format should be determined in consultation with industry as a recommendation for NCL licensees. Rogers added that although an NCL licensee could potentially use non-TDD technology, the licensee should ensure coexistence with TDD-

based systems operating in adjacent bands to NCL licensed bands. It is anticipated that use of non-TDD-based technology by an NCL licensee would require setting guard bands to ensure coexistence with TDD-based systems deployed in adjacent bands to NCL licensed bands.

234. In its reply comments, TELUS emphasized the inefficiencies of an automated licensing process that would need to assume the worst case of unsynchronised operations (e.g. potentially rejecting many applications due to coexistence, limiting licences with large distance separations, or defaulting to a manual process). However, TELUS iterated its strong support for RABC's recommendation on how a common TDD synchronization pattern helps with adjacent band (and block) coexistence between TDD systems.
235. According to Dynamic Spectrum Alliance and Federated Wireless, dynamic spectrum access technology could facilitate coordination in the absence of mandated synchronization functions. This can be accomplished if the industry agrees to a set of predefined TDD configurations and then identifies a process for determining which configuration should be implemented.
236. Conversely, Bell and Motorola opposed the proposals and believed that TDD synchronization is essential to enable coexistence between TDD systems particularly in areas where there are multiple licensees operating in very close proximity to each other. In its reply comments, Bell agreed with TELUS in regard to recommending a common TDD format for consideration by most conventional use cases.

Discussion

237. **Conduct coexistence analyses through automated licensing process and need for feedback on rejected applications:** Regarding an automated application and interference analysis system, responses from stakeholders were generally positive. It is anticipated that there will be several users operating in close proximity to each other in NCL licensed bands; checking the potential for interference prior to application approval will help to mitigate interference issues. Users, particularly new spectrum users, are likely to want a simple and cost-effective way to access spectrum and to operate in an interference-managed environment.
238. As there is the potential for a high number of applications, an automated review system would help to ensure that applications are processed relatively quickly.
239. In view of this, and with the aim to have a licensing approach that is easy for users to access spectrum, ISED will manage access to NCL licensed bands and perform technical coexistence analysis between NCL licensed operations through an automated licensing system. This will ensure expeditious processing, minimize the burden of coordination between new users, and create a consistent process for users to access spectrum in the NCL licensed bands. As discussed above, although specific station deployments will not be used to determine interference potential during the licensing phase, a database of registered

deployments will be maintained to assist in resolving interference issues in the future, if required.

240. **Not mandating specific technology:** ISED typically develops technical rules that allow for a wide range of usage scenarios, while also encouraging spectral efficiency and orderly coexistence with other users (including non-NCL licensed) in the band and in adjacent bands. Appropriate technical rules will be developed on a band-by-band basis.
241. The NCL licensing system will facilitate coexistence between users. However, there is a potential for interference from operations that are located in close proximity. Certain prescriptive blanket measures could be imposed at the outset by ISED on all NCL licensees. However, ISED believes that some of these measures, such as broadly imposed technology specific techniques, may unnecessarily constrain certain use cases and result in potentially inefficient use of spectrum.
242. In certain cases, ISED is of the view that mutual cooperation between licensees, when necessary, provides the maximum flexibility to impacted licensees to resolve any potential interference issues. Licensees could benefit from the detailed knowledge of their respective systems and could be in better positions to resolve any interference issues that arise through mutual cooperation and implementation of appropriate coexistence mechanisms.
243. Consequently, ISED will implement certain coexistence measures (e.g. appropriate separation distances) in the NCL licensing system to facilitate coexistence; however, it does not intend to broadly impose technology specific coexistence techniques (e.g. mandated TDD synchronization) for all frequency bands to manage potential interference at this time but encourages licensees to work together to resolve any potential interference issues as necessary. Any specific coexistence measures will be considered on a band-by-band basis.
244. Regarding feedback on rejected applications, comments from stakeholders were supportive. ISED acknowledges that it would be useful to provide feedback as part of the application process. Applicants will be informed of the reason for the rejection of their application and will be given an opportunity to re-apply through the automated system.

Decisions

D20 ISED will not broadly impose a single set of specific technology solutions to address interference for all NCL licensed bands but encourages licensees to work together to resolve any potential interference issues as necessary. However, on a band-by-band basis, ISED will set technical rules to facilitate coexistence in the band and may consider specific technology solutions, including TDD synchronization requirements, to address interference issues.

D21 ISED will manage access to the NCL licensed bands by conducting coexistence analyses through an automated licensing process. Feedback will be provided for applications that are rejected.

5.6 Fees for NCL licensing

245. Licence fees are part of the overall spectrum management regulatory scheme that supports the efficient use of spectrum by licensees. The Minister is provided the general powers for spectrum management in Canada pursuant to section 5 of the *Radiocommunication Act*. Section 19 of the *Department of Industry Act* gives the Minister the authority to issue authorizations and fix the fees with respect to the privilege of using spectrum. The Minister has used this power in the past to establish various fees related to the use of spectrum under spectrum licences.
246. In the Consultation, ISED proposed fees with a view to support consistency and promote the efficient use of spectrum. The proposed fee structure was designed to assign fees according to the amount of spectrum consumed and to discourage situations where spectrum is effectively consumed at no cost and denied to others. In accordance with this approach, the proposed annual spectrum licence fee would be based on the amount of spectrum assigned (in MHz) and the size of the licence area (in km²) multiplied by a base fee rate.
247. The proposed formula is shown below:
- $$\text{Annual spectrum licence fee} = \text{base rate} \times \text{spectrum assigned (MHz)} \times \text{licence area (km}^2\text{)}$$
248. ISED further proposed that licences authorized during a fiscal year (ISED's fiscal year begins April 1 and concludes March 31), or authorized for durations of less than one year, would have a prorated fee applied.

5.6.1 Fees base rate for NCL licensing below 10 GHz

249. ISED sought comments on its proposal to implement a fee regime for NCL licences using low and mid-band spectrum. Specifically, ISED proposed the following base rates:
- the proposed annual fee base rate of \$35.93 per MHz per km² for calculating annual licence fees for spectrum licensed in metropolitan/urban areas and a minimum total licence fee of \$48.00 annually or \$4.00 monthly
 - the proposed 75% reduced annual base rate (\$8.98 per MHz per km²) for calculating annual licence fees for spectrum licensed in rural areas and a minimum total licence fee of \$48.00 annually or \$4.00 monthly
 - the proposed 95% reduced annual base rate (\$1.80 per MHz per km²) for calculating annual licence fees for spectrum licensed in remote areas and a minimum total licence fee of \$48.00 annually or \$4.00 monthly
250. ISED also sought comments on its proposal to consider applying this fee structure to all NCL licensing spectrum licences below 10 GHz.

Summary of comments

251. **Fee regime for low and mid-band:** TELUS did not oppose ISED's proposal but recommended that the proposed rates would not be suitable for opening bids or renewal fees for auctioned licences of similar frequencies. TELUS also noted that in rural and remote areas an order of magnitude reduction in fee rates in unpopulated areas could reduce the cost for potential NCL licensees.
252. Meta agreed with the fee regime so long as it is enough to cover the costs of the regulator and promote the efficient use of spectrum while maintaining incentives for businesses and consumers to invest.
253. Motorola supported the proposed fees in rural and remote areas but proposed that fees should be lowered to \$18/MHz/km² in urban areas.
254. Ecotel supported the proposed rates for urban and remote areas but pointed out that the proposed base rates for rural areas were too high for licensing large areas with low population density.
255. CanWISP and TekSavvy, supported by the BCBA, Bell, Rogers, Sogetel, , ISOC-ICI-Mozilla and Xona argued that the fees should be set at lower rates, particularly in rural and remote areas. ECN indicated fees were too high specifically for remote areas.
256. CanWISP and TekSavvy, supported by the BCBA, opposed ISED's proposed fees, arguing that they are excessive and will not support viable business models in any but the densest urban environments or smallest geographic footprint. Sogetel supported the fee structure but submitted that the proposed licence fees would not allow for viable FWA operation.
257. CanWISP and TekSavvy, supported by the BCBA, disagreed with using the existing cellular and PCS base rate as the basis for the proposed base rates for low and mid-band NCL licences. CanWISP and TekSavvy suggested using a \$/MHz/population fee structure equal to one tenth of the existing cellular and PCS licence fee and based on the estimated population of the licence area.
258. CanWISP and TekSavvy, supported by the BCBA, submitted that if ISED is determined to use a fee structure based on area, rather than population, the fees should be significantly reduced, by an order of magnitude, with a minimum flat fee of \$250 in rural and remote Tier 5 service areas. CanWISP and TekSavvy also indicated that the fee base rate in urban areas should be lower than the fee base rate in metropolitan areas.
259. Rogers submitted that ISED should adopt an apparatus-based fee approach for NCL licensed bands, not one based on area. Rogers also submitted that base rates should be scaled relative to spectrum frequencies, based on propagation and scarcity. Rogers argued that there should be a reduction in fees for rural and remote licences, reflecting the reduced demand for spectrum in these areas and the more challenging deployment economics in these areas.

Rogers also suggested a more flexible approach that would allow NCL operators to apply for a reduced area price if their licence covers only areas with no significant population centre. For example, in an urban area, an operator would be able to apply for the rural fee rate.

260. SaskTel suggested that if the fees for NCL licences were not set higher, then the ISED spectrum management costs would not be covered. CanWISP and TekSavvy disagreed with SaskTel's position and argued that there is no valid argument to support fees that recover the cost of administering licences when these licences will be used to bring broadband services to underserved rural communities.
261. The MAC submitted that fees should be lower than going through third party providers.
262. FMCC proposed waiving fees for Indigenous providers and coverage of Indigenous land. ISOC-ICI-Mozilla also proposed spectrum fees be waived for Indigenous communities.
263. **Fee structure to all NCL licensed spectrum below 10 GHz:** Ecotel and Sogetel supported applying the same fee structure to all NCL licences below 10 GHz.
264. CanWISP and TekSavvy, supported by the BCBA, indicated that it would be appropriate to charge a higher rate for lower frequencies, and a lower rate for higher frequencies, if other NCL licensed bands are identified below 10 GHz.
265. Bell and Rogers did not support applying the fee structure to all spectrum licences below 10 GHz. Rogers indicated that Organisation for Economic Co-operation and Development countries charge significantly reduced rates as frequencies increase and that 10 GHz should be valued at 0.3% of the existing cellular/PCS fee. Bell suggested a separate consultation be issued as future NCL licences become available. Xona did not support applying the same fee as propagation performance would vary significantly for bands throughout 0-10 GHz.

Discussion

266. ISED has traditionally used population data when establishing fees for spectrum licences. Some stakeholders argued that a population-based model should continue to be used for the NCL licensing framework. However, ISED continues to be of the view that fees based on population data are not well suited to the proposed NCL licensing framework since it will be difficult to determine accurate population values for all custom vector licence areas, in particular for use cases that are suited to very small licence areas. Furthermore, some anticipated use cases for NCL licensing would include areas with no full-time residents, such as, sports venues, resource extraction sites such as mines as well as industrial/academic/health care campuses. As a result, ISED's view is that an area-based fee is appropriate for NCL licences.
267. Many stakeholders argued that ISED's proposed base rates for low and mid-band NCL licensing fees were too high, and would negatively impact business cases for NCL licences, particularly those in rural and remote areas.

268. ISED recognizes that the proposed fee base rates may not sufficiently support all local licensing use cases. In ISED's view, reducing the fee base rates for NCL licences will further encourage innovation and viability of the intended use cases for NCL licences, particularly in rural and remote locations, and will support access to NCL licences, which could benefit Canadians through the introduction of innovative new wireless services. ISED will apply the following annual licence fees to NCL licences below 10 GHz:
- \$1.80 per MHz per km² for NCL licences in metropolitan and urban areas
 - \$0.45 per MHz per km² for NCL licences in rural areas
 - \$0.01 per MHz per km² for NCL licences in remote areas
269. In ISED's view, these revised fee base rates will ensure that Canadian consumers, businesses and public institutions, particularly in rural and remote areas, will benefit from NCL licensing.
270. As prescribed in section 17(1) of the [Service Fees Act](#), the proposed licence fee base rates will be adjusted yearly in accordance with the Consumer Price Index (CPI).
271. **Apply fee structure to all NCL licensed spectrum below 10 GHz:** ISED proposed to apply the above licence fee structure to future licensing processes for NCL licences below 10 GHz. Some stakeholders opposed ISED's proposal, arguing that a single fee rate for all NCL licences is not appropriate given the difference in propagation characteristics and value of the various bands below 10 GHz. In ISED's view, having a single fee structure for all NCL licences below 10 GHz will provide regulatory certainty for potential users if ISED expands NCL licensing to bands below 10 GHz in the future. This will also support ISED's intention to establish an NCL licensing framework that can be applied generally to multiple bands. ISED therefore intends to apply the fee structure described above to future NCL licences below 10 GHz. ISED will consult on implementing the fee in any additional bands added in the future to the NCL framework.

Decisions

D22 ISED will apply the following annual licence fees to NCL licences using bands below 10 GHz:

- \$1.80 per MHz per km² for NCL licences in metropolitan and urban areas
- \$0.45 per MHz per km² for NCL licences in rural areas
- \$0.01 per MHz per km² for NCL licences in remote areas

D23 ISED intends to apply the above fee structure to future bands below 10 GHz (low and mid-bands) that are added to the NCL licensing framework.

5.6.2 Fees for NCL licensing at or above 10 GHz

272. ISED sought comments on its proposal to implement a fee regime for NCL licences using high-band spectrum. Specifically, ISED proposed the following base rates:
- \$3.59 per MHz per km² for calculating annual licence fees for spectrum licensed in metropolitan/urban areas
 - \$0.90 per MHz per km² for calculating annual licence fees for spectrum licensed in rural areas
 - \$0.18 per MHz per km² for calculating annual licence fees for spectrum licensed in remote areas
273. ISED also sought comments on its proposal to consider applying the above fee structure to NCL licences in the 10-95 GHz frequency range.

Summary of comments

274. **Fee regime for high-band:** CanWISP and TekSavvy, supported by BCBA, Ecotel and Sogetel, supported making fees for high-band NCL licences 10% of the rates for low and mid-band NCL licences.
275. Bell did not object to ISED's proposal and supported discounted rates in rural and remote areas. TELUS did not oppose ISED's proposal but recommended that the rates proposed would not be suitable for opening bids or renewal fees for auctioned licences of similar frequencies.
276. Rogers submitted that ISED should adopt an apparatus-based fee approach for NCL licence bands, not one based on area. Rogers argued that should ISED decide to adopt a consumption-based rate, there should be a larger reduction of cost. TERAGO argued that fees need to reflect the widely different economics of mobile and fixed service and reflect values of different geographic areas. Xona submitted that the proposed fees may work for urban and indoor areas but that the proposed fees in rural and remote areas would not lead to a positive business case.
277. **Apply fee structure to all NCL licence spectrum in the 10-95 GHz frequency range:** Ecotel and Sogetel supported applying the same fee structure to all NCL licences in the 10 GHz-95 GHz range.
278. CanWISP and TekSavvy, supported by the BCBA, indicated that it would be appropriate to charge a higher rate for lower frequencies, and a lower rate for higher frequencies, if other NCL licence bands are identified in the 10-95 GHz frequency range.
279. Bell, Rogers and Xona did not support ISED's proposal. Bell submitted that a separate consultation be issued as future NCL licences become available. Rogers argued that the fee structure should be apparatus-based as it is not intended to provide wide-area public mobile access but targeted private wireless networks and limited fixed wireless deployments. If a consumption-based structure is adopted, spectrum licence fee rates should be discounted at

higher frequencies. Xona argued that it is premature to apply the same fee structure to all licences in the 10-95 GHz range as all use cases vary with different cost economics.

Discussion

280. **Fee regime for NCL licensing at or above 10 GHz:** the proposed licence fee base rates for NCL licence fees at high-band are proposed to be 10% of those proposed for low-band and mid-band in ISED's view, a lower base rate for high-band spectrum continues to be appropriate considering the characteristics of high-band spectrum. High-band spectrum NCL licences will consist of significantly larger spectrum blocks (e.g. 50 and 100 MHz), compared to low and mid-band NCL licences. Furthermore, the physical characteristics of high-band spectrum, including the reduced propagation compared to low and mid-band spectrum, require denser deployments and can create challenges in deploying networks in less-densely populated areas of Canada.
281. For those reasons, ISED continues to be of the view that it would be appropriate to apply fees for high-band NCL licences that are 10% of those for NCL licences below 10 GHz. As such, ISED will apply annual licence fees to NCL licences at or above 10 GHz as follows:
- \$0.18 per MHz per km² for NCL licences in metropolitan and urban areas
 - \$0.045 per MHz per km² for NCL licences in rural areas
 - \$0.001 per MHz per km² for NCL licences in remote areas
282. As prescribed in section 17(1) of the [Service Fees Act](#), the proposed licence fee base rates will be adjusted yearly in accordance with the CPI.
283. **Apply fee structure to all NCL licenced spectrum in the 10-95 GHz frequency range:** ISED proposed to apply above licence fee structure to future licensing processes for NCL licences in the 10-95 GHz range. Some stakeholders opposed ISED's proposal, arguing that a single fee rate for all NCL licences is not appropriate given the difference in propagation characteristics and value of the various bands at or above 10 GHz. In ISED's view, having a single fee structure for all NCL licences at or above 10 GHz will provide regulatory certainty for potential users if ISED expands NCL licensing to bands above 10 GHz in the future. This will also support ISED's intention to establish an NCL licensing framework that can be applied generally to multiple bands. ISED therefore intends to apply the fee structure described at or above to bands above 10 GHz that are added to the NCL licensing framework.

Decisions

- D24** ISED will apply the following annual licence fees to NCL licences using bands at or above 10 GHz:
- \$0.18 per MHz per km² for NCL licences in metropolitan and urban areas
 - \$0.045 per MHz per km² for NCL licences in rural areas
 - \$0.001 per MHz per km² for NCL licences in remote areas
- D25** ISED intends to apply the above fee structure to future bands at or above 10 GHz, which are added to the NCL licensing framework.

5.6.3 Implementing the proposed NCL licensing fees

284. **Minimum fees:** Minimum fees have been used in spectrum licensing as a proxy to reflect the value of a licence when the calculated value is below a reasonable threshold. ISED proposed a minimum fee of \$48 per year, which would apply whenever the use of the area-based fee model would result in an annual fee lower than \$48.00.
285. **Prorated fees:** ISED proposed that prorated fees would be calculated using 1/12 of the applicable annual fee, charged for each calendar month (in whole or in part) of the licence's duration. Fees for renewable licences will be charged for each calendar month (in whole or in part) until March 31 of the current fiscal year, based on the month in which the licence becomes valid.
286. **Fees for licences that overlap Tier 5 boundaries:** Licences eligible for rural and remote discounts are those located within the rural and remote Tier 5 service areas respectively, as defined in DGSO-006-19, [Decision on a New Set of Service Areas for Spectrum Licensing](#). For licence areas overlapping two area types, ISED proposed to follow the precedent set out in DGSO-004-19, [Decision on the Licence Fee Framework for Fixed Point-to-Point Systems](#). If any portion of an NCL licence is located in a remote area, the remote base rate would apply for the entire licence. Otherwise, if any portion of an NCL licence is located in a metropolitan/urban area, the metropolitan/urban base rate would apply for the entire licence.
287. **Service standards:** ISED proposed a service standard of 84 days for licences issued through NCL licensing.

Summary of comments

288. Bell and Rogers supported ISED's proposed service standards. Bell acknowledged that the service standard will likely be improved through the use of automation in the licensing process and Rogers' support of the proposed service standard was with the expectation that many licences would be issued sooner.

289. CanWISP and TekSavvy, supported by BCBA, Ecotel, Meta and Sogetel, opposed ISED's proposed service standards. CanWISP and TekSavvy submitted that the proposed 84 day service standard is too long, and instead recommended 49 days. Sogetel argued that 84 days is too long, but that this length may be needed in the first few months of NCL licensing. Ecotel argued three months is too long and suggested two months to provide a response and one month to issue the licence. Meta believes 30 days is a possible time frame, referencing the existing 28 day service standard for terrestrial FCFS.

Discussion

290. **Minimum fees:** Stakeholders did not object to ISED's proposed minimum fee of \$48.00 per year. ISED will therefore apply a minimum fee of \$48.00 per year, or \$4.00 per month, to NCL licences.

291. **Prorated fees:** Stakeholders did not object to ISED's proposal to apply prorated fees to NCL licences. For licences authorized during a fiscal year, or authorized for durations of less than one year, prorated fees will be calculated using 1/12 of the applicable annual fee, charged for each calendar month (in whole or in part) of the licence's duration. Fees for renewable licences will be charged for each calendar month (in whole or in part) until March 31 of the current fiscal year, based on the month in which the licence becomes valid.

292. **Fees for licences that overlap Tier 5 boundaries:** Stakeholders did not oppose ISED's proposal for calculating fees for licences that overlap Tier 5 boundaries. If any portion of an NCL licence is located in a remote area, ISED will apply the remote base rate for the entire licence. Otherwise, if any portion of an NCL licence is located in a metropolitan/urban area, the metropolitan/urban base rate will apply for the entire licence.

293. **Service standards:** In accordance with the [Service Fees Act](#) and related policy directives, ISED set service standards for each of its fees (see [Spectrum and Telecommunications Service Standards](#)). ISED proposed a service standard of 84 days for licences issued through NCL licensing to allow for review or evaluation by ISED. Licence applications would be subject to remissions as per ISED's [Service Fees Remission Policy](#) and the [Spectrum and Telecommunications \(STS\) program annex](#).

294. Service standards help to ensure efficient and effective service delivery. Some stakeholders submitted that ISED's proposed service standard was too long, and proposed various, shorter, alternatives. ISED expects that most licences issued through the NCL licensing framework will be issued quickly, by means of a user-friendly, automated licensing system. However, ISED continues to be of the view that an 84-day service standard is appropriate for NCL licensing, since some licences may not be issued quickly. In these cases, time frames for licence issuance could vary as a result of (but not limited to) the complexity of particular bands where NCL licensing is applied. As such, ISED will apply an 84-day service standard to NCL licensing.

295. ISED expects to implement the new fee prior to the opening of the NCL licensing process. Annual licence fees for renewable licences are payable prior to March 31 in order to renew the annual licence.

Decisions

- D26** ISED will apply a minimum fee for all NCL licences of \$48 per year, or \$4.00 monthly.
- D27** ISED will apply a prorated fee of 1/12 of the total annual fee, per calendar month (in whole or in part) of the NCL licence's duration for renewable licences authorized during a fiscal year, or for non-renewable short-term licences authorized for durations of less than one year.
- D28** ISED will establish a service standard of 84 days for licences issued through NCL licensing to allow for its review or evaluation. Licence applications will be subject to remissions as per ISED's [Service Fees Remission Policy](#) and the [Spectrum and Telecommunications Sector \(STS\) program annex](#).

5.7 Indigenous connectivity

296. ISED sought comments on approaches that would make NCL licensing accessible for Indigenous service providers, businesses, and communities seeking access to spectrum that covers areas they want to service.
297. ISED also sought comments on how it should define a licence applicant as Indigenous when developing policies to increase accessibility to spectrum for Indigenous service providers, businesses, and communities.
298. Additionally, ISED sought comments about the challenges (e.g. administrative, regulatory, technical) Indigenous peoples face when accessing spectrum, and suggestions on how ISED can remove these barriers.

Summary of comments

299. CanWISP, Dr. Gregory Taylor, Ecotel, ECN, Federated Wireless, FMCC, First Nations Technology Council, ISOC-ICI-Mozilla, Rogers, SES, Sogetel, Smoke Signal Communications Inc., SSi, TekSavvy and TELUS acknowledged the importance of improving Indigenous people's access to spectrum and were generally supportive of ISED taking positive steps to improve engagement with Indigenous peoples.
300. Some respondents offered suggestions on how to make the NCL licensing framework more accessible for Indigenous service providers, businesses and communities seeking access to spectrum that covers areas they want to service. CanWISP and TekSavvy suggested that ISED waive the licence fee for licences that will be primarily used to serve Indigenous communities. Dr. Gregory Taylor suggested that ISED should give Indigenous

service providers priority access to NCL licensed spectrum for the areas covering Indigenous communities.

301. Some respondents acknowledged that, being non-Indigenous, it would not be appropriate for them to comment on what criteria ISED should use when assessing eligibility for any future initiatives seeking to facilitate access to spectrum for Indigenous service providers, businesses and communities. ECN, a Cree-majority owned service provider, suggested that ISED consider a range of models when defining what an Indigenous provider is, and further stated that the main concern should be “that Indigenous peoples and communities be the primary benefactors of any decision.” First Mile Connectivity Consortium, an association of First Nations service providers, argued that it would be “inappropriate to define Indigenous applicants without wider consultation with other Indigenous organizations and representatives.”
302. ISOC-ICI-Mozilla noted that while it is not their purview to provide guidance, there are resources developed by Indigenous organizations that may inform the development of such a definition, such as The Circle on Philanthropy and Aboriginal Peoples in Canada’s [I4DM](#).
303. Respondents also identified several barriers Indigenous peoples face when trying to access spectrum and put forward recommendations for ISED to consider removing these barriers.
304. ECN submitted that “not one Indigenous entity holds a radio frequency spectrum licence for the provision of broadband services,” and that auctions are not a viable way for Indigenous service providers to obtain spectrum, since they do not have the resources to compete against larger incumbents. FMCC agreed with these statements. As a potential solution, ECN and FMCC, as well as Dr. Gregory Taylor and Ecotel, advocated for ISED to grant First Nations, Inuit, and Métis priority access to spectrum over their lands. ECN and FMCC suggested ISED adopt a similar approach to the Tribal Priority Window implemented by the FCC in the US, as a workable mechanism for Indigenous providers to obtain spectrum. While they did not specify a priority window, ISOC-ICI-Mozilla submitted that ISED should “release unused spectrum licenses on and over Indigenous traditional territories for the use by and benefit of Indigenous peoples.”
305. Respondents also highlighted the need for better collaboration and engagement with Indigenous peoples on spectrum matters. ECN encouraged ISED “to assess its policy processes and principles and explore how to better involve Indigenous parties.” ECN also pointed out that they were the only Indigenous entity to respond to ISED’s initial call for comments on the NCL licensing framework, which “suggests that the hearing was not well-publicized or well-understood by those who will be impacted by the decisions made in this hearing.” ECN called for ISED to undertake a broader consultation to address Indigenous access to spectrum. CanWISP and TekSavvy supported this suggestion in their reply comments.
306. TELUS also argued for improved collaboration with Indigenous peoples on spectrum policy matters and suggested a “collaborative forum with Government, Indigenous

governments and network providers to discuss all telecommunications policy, including spectrum policy.”

307. FMCC also highlighted the need to improve training and outreach among Indigenous organizations so that they can acquire licences and be more informed of spectrum policies. They proposed an outreach by ISED staff, to provide or organize such training. FMCC referenced the example of the FCC’s Office of Native Affairs and Policy, which has conducted field visits and workshops for Indigenous groups in the US. Smoke Signal Communications Inc. also argued for the need to better inform and educate First Nations on spectrum policy matters. The Internet Society, the Indigenous Connectivity Institute (an initiative of Connect Humanity), and ISOC-ICI-Mozilla also highlighted the need for capacity building within communities, and the “lack of qualified Indigenous people to build, operate and maintain networks.” They advocated for “a dedicated multi-faceted workforce development effort targeted at Indigenous youth and other individuals seeking to further their education. This effort should include training opportunities that are safe, accessible, inclusive, and culturally competent.”
308. ECN, First Nations Technology Council, ISOC-ICI-Mozilla and TELUS called on ISED to apply the *United Nations Declaration on the Rights of Indigenous Peoples* to its spectrum management policies, and to treat Indigenous peoples as rights holders rather than stakeholders. The First Nations Technology Council submitted that “this requires the acknowledgement of Indigenous Peoples’ inherent right to govern and manage the spectrum on and over their lands and to participate in shared decision-making over approaches towards spectrum allocation”.

Discussion

309. The NCL licensing framework, and its localized licensing approach, is uniquely suited to provide access to spectrum that can support connectivity to Indigenous communities. ISED is of the view that the general criteria outlined in section 5, as well as the specific measures outlined in section 6 for the 3900 MHz band, should facilitate access to spectrum for Indigenous service providers, businesses and communities for areas they want to serve. The NCL licensing framework is one of several recent initiatives that ISED has undertaken to reduce barriers to spectrum access and drive connectivity in rural, remote and Indigenous communities. The Consultation on the [Spectrum Outlook 2022-2026](#) proposed Indigenous connectivity as a key priority for the spectrum program, and the [Consultation on New Access Licensing Framework](#), Changes in Subordinate Licensing and White Space to Support Rural and Remote Deployment proposed to make unused licensed spectrum available to interested parties.
310. While these initiatives are positive steps towards improving spectrum access for Indigenous communities, service providers and businesses, ISED acknowledges more needs to be done to further support economic reconciliation and meaningful engagement with Indigenous peoples. Feedback received from Indigenous respondents, through this consultation, the Consultation on ISED’s Spectrum Outlook, and from informal engagement

with Indigenous communities, businesses and organizations, has made it clear that spectrum access as well as improved engagement with Indigenous partners is critical to improving connectivity in Indigenous communities. Respondents also highlighted the need for a separate engagement focussed on Indigenous access to spectrum, to give these issues the attention they deserve and allow for more participation from Indigenous communities, businesses and organizations. ISED agrees that these issues warrant their own dedicated discussion, and that a path forward can only be found through collaboration with Indigenous partners. Therefore, in the coming months, ISED will be launching an Indigenous focused engagement where it will seek to collaborate with Indigenous partners on options to support access to spectrum.

311. ISED is also taking steps to build capacity within the spectrum program so that interested partners can meaningfully engage with ISED on spectrum-related topics. This includes the recent launch of an *Indigenous Spectrum Policy Team* (ISPT), which is focused exclusively on Indigenous spectrum policy development and engagement. This new team is actively collaborating with peer regulators, internal ISED teams, other government departments, and Indigenous partners to increase engagement with Indigenous people and ensure Indigenous priorities are reflected in the policy development process. Feedback from these engagements will continue to inform ISED's work to support Indigenous access to spectrum.

5.8 Implementation of the NCL licensing framework

312. As part of creating an NCL licensing regime, ISED noted that legislative amendments may need to be made to account for automated decisions, a new Client Procedures Circular (CPC) may be required as portions of CPC-2-1-23 may not apply, and licence renewals may follow a different process than in the past. ISED sought comments on these concepts.

Summary of comments

313. CanWISP, Sogetel and TekSavvy supported ISED's proposals made in the implementation section of the Consultation regarding legislative amendments, a new CPC, and the renewal process.
314. RAC did not comment on legislative amendments but supported a new CPC, as well as ISED's proposals regarding the renewal process. RAC additionally commented that the CPC should provide or point to instructions on the use of the automated process for applicants and provide guidance for prospective NCL licence applicants. RAC added that if ISED were to cancel a licence, ISED should provide adequate notification to the licensee to ensure that proper action can be taken to avoid cancellation.
315. Qualcomm supported the renewal process but did not comment on legislative amendments or a new CPC. While Bell supported the licence renewal proposal, it argued that more information would be needed to comment on legislative amendments or a new CPC. It recommended that ISED prepare a draft of the legislative amendments and new

CPC, and then initiate a short consultation that allows stakeholders to comment on the proposed changes. Bell further suggested that the automated licensing process be developed with industry stakeholder input at RABC. Electricity Canada argued that operators should have the option to renew their licences on a three- or five-year timeline.

Discussion

316. **NCL licensing CPC:** As noted in the Consultation, the provisions of CPC-2-1-23, [*Licensing Procedure for Spectrum Licences for Terrestrial Services*](#) may not always be appropriate or applicable to an NCL licensing context. Many of the stakeholders that commented supported the creation of a CPC to provide clarity and guidance for NCL licensing.
317. ISED will be creating a new CPC, based on the considerations discussed in the Consultation, and the outcomes set out in this Decision to provide guidance and clarity to NCL licensees and potential applicants. ISED intends to publish the CPC before it starts accepting NCL licensing applications. Further, the provisions of CPC 2-1-23 will not apply to NCL licences, notwithstanding the fact that they are terrestrial spectrum licences.
318. **Licence renewal:** Most stakeholders agreed with the planned renewal process. At the end of the proposed licence term, there will be a high expectation of renewal. Licensees will normally be issued new licences following a renewal process unless a breach of a licence condition occurs, a fundamental reallocation of spectrum to a new service is required, or an overriding policy need arises. Section 40 of the *Radiocommunication Regulations*, regarding the assignment of frequencies, continues to apply.
319. As noted in section 5.4, NCL licences will be subject to relevant provisions in the *Radiocommunication Act* and the *Radiocommunication Regulations*. For example, the Minister continues to have the power to amend the terms and conditions of spectrum licences (as per paragraph 5(1) (b) of the *Radiocommunication Act*).
320. Licensees will be required to pay any fees applicable to the licence and be in compliance with the conditions of licence, including deployment requirements, in order for the licence to be eligible for renewal.

Decision

D29 NCL licences will be eligible for annual renewal provided that they are in compliance with their licence conditions, including those relating to deployment, and they have paid the applicable fee.

D30 ISED will be creating legislative amendments to support automated licensing in NCL licence bands, will create a new CPC based on the considerations discussed in the Consultation, and the outcomes set out in this Decision to provide guidance and clarity to NCL licensees and potential applicants.

6. NCL licensing in the 3900 MHz band

321. In the [*Decision on the Technical and Policy Framework for the 3650-4200 MHz Band and Changes to the Frequency Allocation of the 3500-3650 MHz Band*](#) (the 3800 MHz Repurposing Decision), ISED designated 80 MHz of spectrum in 8 unpaired 10 MHz blocks for shared use in the 3900-3980 MHz band, which are adjacent to a 20 MHz guard band in 3980-4000 MHz, and further indicated that this would be made available through a non-competitive licensing process.
322. ISED sought comments on applying a non-competitive local licensing framework to the 3900 MHz Band. ISED also sought comments on the equipment ecosystem for NCL licensing in the 3900 MHz band.

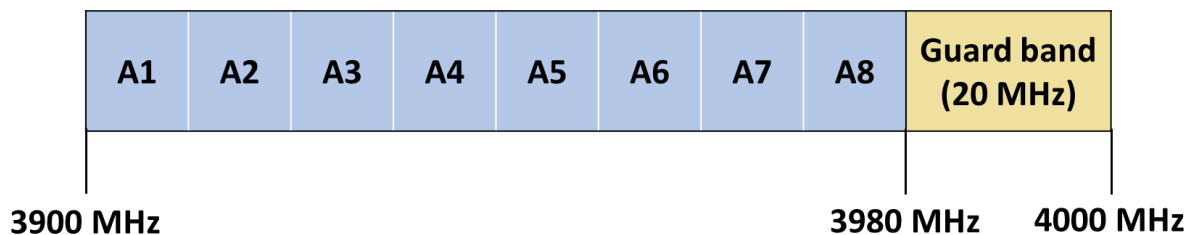
Summary of comments

323. Bell, Dr. Gregory Taylor, Dynamic Spectrum Alliance, ECN, Federated Wireless, Motorola, Qualcomm, Rogers and Sogetel generally supported ISED’s proposal to apply the NCL licensing framework to the 3900 MHz band in all areas. Bell noted that the readily available equipment ecosystem for the 3900 MHz band makes it a suitable candidate for NCL licensing.
324. Xplore supported ISED’s proposal, provided the new deployment rules do not impair the ability of rural providers to use this spectrum to serve rural areas. Similarly, CanWISP and TekSavvy supported ISED’s proposal, provided ISED adopts their proposals to modify the restrictions on spectrum aggregation, geographical limitations, power levels, licence terms, and the proposed licence fees.

Discussion

325. ISED recognizes that many countries have been making spectrum available for flexible use in the 3.4-4.2 GHz band, or portions thereof, including on a shared basis or for local access. As such, the global equipment ecosystem for 5G devices is fairly mature and continues to evolve as more use cases are still emerging.
326. Given the decision in the 3800 MHz Repurposing Decision to make the 3900 MHz band available for non-competitive shared licensing and given that this band is expected to have a readily available equipment ecosystem, ISED will apply the NCL licensing framework as described in section 5 to the 3900 MHz band. As such, ISED will apply the NCL licensing framework to the 8 unpaired 10 MHz blocks shown in figure 1.

Figure 1: 3900 MHz NCL licensing band plan



Description of figure 1

This figure shows the new band plan for the 3900-3980 MHz band. The adopted plan is composed of 8 unpaired blocks of 10 MHz ranging from 3900-3980 MHz, which are adjacent to a 20 MHz guard band in 3980-4000 MHz.

327. The conditions of licence for the general NCL licensing framework (annex A) as discussed in section 5 will form the basis of the 3900 MHz band licensing conditions. As noted, additional conditions may be applied on a band-by-band basis, particularly with respect to measures to support access to NCL licensed bands. See section 6.2 below for a

discussion on measures to support access, with annex B detailing the complete list of conditions for 3900 MHz band licences. In addition, for operations in block A1 (3900-3910 MHz) see section 6.3 with regards to adjacent band coexistence.

Decisions

D31 ISED will apply the NCL licensing framework described in section 5 to the 3900 MHz band.

D32 ISED will apply the NCL licensing framework to the 8 unpaired 10 MHz blocks in the 3900 MHz band shown in figure 1.

D33 NCL licences in the 3900 MHz band will be subject to conditions of licence contained in annex B.

6.1 Eligibility

328. In the Consultation, ISED did not propose any specific eligibility requirements for the 3900 MHz band. However, several commenters proposed that ISED consider restricting eligibility to the band.

Summary of comments

329. Section 5.4.2 above sets out comments from stakeholders with respect to eligibility requirements for NCL licences generally. A number of smaller stakeholders argued for restricting NCL licence access to larger mobile service providers. Many advocated for restricting access to NMSPs and RMSPs, due to foreclosure concerns.

330. CanWISP, Ecotel, TekSavvy Sogetel and TERAGO opposed allowing NMSPs to access NCL licensed spectrum. The Mining Association of Canada expressed general foreclosure concern by the larger telecommunications companies. CanWISP, TekSavvy, RAC, ISOC-ICI-Mozilla and BCBA argued that large mobile operators have the incentive to warehouse spectrum to the detriment of smaller mobile operators, and thus called on ISED to prohibit NMSPs and RMSPs from obtaining NCL licences as the simplest way to ensure access to NCL spectrum. Similarly, Ecotel pointed out spectrum warehousing practices of large mobile operators and requested that ISED follow the proposal of Bundesnetzagentur, the German telecommunications regulator to restrict large Canadian mobile network operators from accessing NCL licensed spectrum.

331. CanWISP and TekSavvy all proposed that the most effective way to ensure a broad variety of operators and companies can access NCL spectrum is to prohibit NMSPs and RMSPs from accessing NCL licences. In its reply comments, Sogetel proposed that instead of imposing technical restrictions that will inevitably impede the usability of the band and the availability of equipment for licensees, ISED should rather prevent large incumbents

from accessing the NCL licensing framework until it can be established that smaller service providers have no need for the spectrum.

Discussion

332. In section 5.4.2 above, ISED decided that eligibility requirements for NCL licences may be established on a band-by-band basis. As discussed in section 3, ISED is seeking to facilitating low-barrier access to spectrum to support the needs of new users, including industry verticals with NCL licensing. Given that 3900 MHz will be the first band available for NCL licensing, that ISED expects there to be a significant demand for this band and that WISPs, smaller mobile operators and non-traditional users (e.g. industry verticals) may take some time to develop their business cases for using this spectrum, ISED is of the view that it is appropriate to reserve a portion of the 3900 MHz band, from 3940 MHz to 3980 MHz, for use by small operators including small commercial mobile service providers, non-traditional users (NTUs) and WISPs.
333. Based on the current CRTC Annual Telecommunications Survey, small commercial mobile service providers and wireless broadband service providers have less than 100,000 retail mobile phone subscribers. In general, small commercial mobile service providers typically provide very localized and rural and remote services. For these entities, obtaining an entire tier of spectrum at auction to provide commercial mobile service would typically be excessive for their needs. NTUs may be seeking to serve their own users with private networks with mobile services; these types of users would not be considered as mobile subscribers.
334. Normally, once an operator has 100,000 mobile subscribers, it effectively means that they offer commercial mobile services in large urban, or multiple populations centres. At this scale, they also typically have more need and resources to access full tier(s) of spectrum through auction to provide commercial mobile services.
335. For the purposes of this Decision for the 3900 MHz band, small operators are defined as those entities (and their affiliates, as defined in section 6.2 of this document) with less than 100,000 retail mobile phone subscribers, as reported to the CRTC through its Annual Telecommunications Survey. This approach would restrict access to the 3940-3980 MHz portion of the band by larger mobile service providers. Accordingly, operators with more than 100,000 retail mobile subscribers as reported to the CRTC through its Annual Telecommunications Survey will be ineligible to hold NCL licences for blocks from 3940 MHz to 3980 MHz (i.e. blocks A5, A6, A7, and A8).
336. This eligibility restriction will be incorporated into the conditions of licence for 3900 NCL licences, set out in annex B. Eligibility restrictions will continue to apply if an NCL licensee is acquired or otherwise becomes affiliated with an ineligible operator, in which case, the NCL licence must be returned to ISED. ISED will monitor NCL licensing uptake with a view to adjusting this eligibility restriction, if appropriate. Further, ISED intends to conduct a review of the continued applicability of the eligibility restriction of three years from the date that the first NCL licence in the 3900 MHz band is issued.

Decision

D34 The 3940 MHz to 3980 MHz portion of the 3900 MHz band will be reserved for use by small operators including small commercial mobile service providers, non-traditional users (NTUs) and WISPs .

D35 Any entity, or affiliate of that entity (as defined in section 6.2), with 100,000 or more retail mobile phone subscribers as reported to the CRTC through its Annual Telecommunications Survey is ineligible to hold a licence for the blocks from 3940 MHz to 3980 MHz.

6.2 Measures to support local access to the 3900 MHz band

337. In the Consultation, ISED sought comments on its proposal to apply measures to support access in the 3900 MHz band. ISED sought comments on applying an aggregate area limit of 5%-20% to the NCL licence area in any individual Tier 5 service area, regardless of specific frequency blocks within the 3900 MHz band and/or a spectrum aggregation limit (cap) of 20 MHz to a licensee within any contiguous licence area in any individual Tier 5 service area. In addition, ISED sought feedback on whether these measures should be time limited for three years or if a longer amount of time would be appropriate, and if these should be different for metropolitan, urban, rural and remote Tier 5 service areas.

Summary of comments

338. **Aggregate area limit:** Bell and Motorola supported ISED's proposal to limit the licence area to an aggregate area limit of 5%-20% in any individual Tier 5 service area, regardless of specific frequency blocks within the 3900 MHz band. BCBA, CanWISP, Ecotel, Meta, Sogetel, TekSavvy and Qualcomm did not support ISED's proposal for an aggregate area limit.

339. Qualcomm recommended the aggregate area limit to be at least 20% of the individual Tier 5 size to provide maximum flexibility for NCL licensees and urged ISED to include exceptions for use cases that serve the public interest. For example, Qualcomm suggested that ISED provide exceptions for local government entities and WISPs that provide service to a rural or remote area.

340. **Spectrum aggregation limit:** Bell and ECN supported a spectrum aggregation limit of 20 MHz per licensee whereas Meta and Electricity Canada recommended 40 MHz per licensee. Electricity Canada noted that 20 MHz would limit data throughput for industrial and customer needs. Motorola proposed the spectrum limit should be 20 MHz in urban areas and 40 MHz in rural and remote areas, with strict build-out requirements and added that urban areas could potentially have lower spectrum limits per user (e.g. 10 MHz per user) to help increase user diversity.

341. BCBA, CanWISP, Ecotel, Qualcomm, Sogetel, TekSavvy and Xona did not support the proposal. BCBA, CanWISP and Qualcomm indicated that a 20 MHz spectrum cap would not be sufficient to support rural broadband services or WIPs. Xona commented that a limit of 20 MHz of spectrum is woefully inadequate for FWA applications in rural areas.
342. CanWISP argued that the proposal from ISED marks a stark reversal from the intent described by ISED in SLPB-002-20, [*Consultation on the Technical and Policy Framework for the 3650-4200 MHz Band and Changes to the Frequency Allocation of the 3500-3650 MHz Band*](#), in which a proposal indicated an intent to provide more spectrum to rural network operators, not less.
343. **Time limited measures:** Bell and RAC agreed with ISED's proposal of a time limitation of three years for both spectrum and area limits. ECN supported a time-limited cap for the 20 MHz spectrum limit. Qualcomm stated that ISED should revisit any limitations it adopts in two years.
344. **Different aggregate area and/or spectrum limits for urban and rural areas:** Regarding the differences for aggregate area and spectrum limits in various service areas, Ecotel believes that spectrum allocation for private networks has to be evaluated on a case-by-case basis. RAC commented that the spectrum limit should be the same, but the aggregate area limit could be different for metropolitan, urban, rural and remote Tier 5 service areas. Whereas Motorola commented that the aggregate area limit should be between 5%-20% for any Tier 5 service area and the spectrum aggregation limit should be 20 MHz in urban and 40 MHz in rural areas.
345. CanWISP and TekSavvy commented that ISED should not impose an area limit in Tier 5 service areas, nor on any limits on NCL licensing deployments that are transitioned from WBS deployments. If ISED chooses to impose a limit in metropolitan Tier 5 service areas, CanWISP and TekSavvy proposed there must be no such restriction in urban, rural, and remote Tier 5 service areas. If ISED chooses to impose an aggregate geographic area restriction in urban, rural, and remote areas, CanWISP and TekSavvy proposed that NCL licensees be ineligible for licences in more than four adjacent Tier 3 service areas.
346. Electricity Canada disagreed with 20 MHz maximum allocations of spectrum in 3900-3980 MHz in rural and remote areas and instead recommended 40 MHz resulting in a maximum of two users in an area. In rural and remote areas 40 MHz should be the maximum allowable licensed spectrum because the likelihood of more than two licensees in any given rural or remote area is extremely low.

Discussion

347. ISED expects that there will be a high demand for NCL licences in the 3900 MHz band in most areas of Canada given that the band can be used to provide broadband connectivity, will have a readily available ecosystem and will be attractive for a variety of use cases including Internet to the home and industrial applications. Given such a high demand and the limited amount of spectrum in the 3900 MHz band, there could be an opportunity that in

some areas a single licensee could request a licence for all 80 MHz in a large geographic area, which would limit the availability to other users in the future. Such an outcome would not meet the policy objectives for the NCL licensing framework outlined in section 3. As such, ISED will implement both licence area and spectrum bandwidth measures for NCL licences in the 3900 MHz band. Additional discussion specific to these measures is provided below. ISED is of the view that these measures will promote a variety of users having access to the spectrum in all areas.

348. ISED recognizes that the 3900 MHz band is a natural extension of the 3800 MHz spectrum being auctioned. ISED will monitor the use of the 3900 MHz NCL licences and may implement additional measures should there be any spectrum warehousing or anti-competitive behaviour by licensees.
349. **Area limit:** An aggregate area limit would limit the contiguous or cumulative geographic area that an operator could acquire under a licence, thus facilitating access for other use cases in adjacent areas. However, ISED acknowledges that a specific aggregate area limit could artificially limit the future extent of deployment in any given area by an operator. As well, given the decision to apply a custom vector-based approach for all licence areas under the general NCL licensing framework, it could be operationally complex to implement under a partially automated licensing system when an NCL licence overlaps multiple Tier 5 areas, using multiple frequency blocks. Consequently, ISED has decided to not adopt an aggregate area limit. Instead, ISED will establish NCL licence types in the 3900 MHz band, as discussed in the following paragraphs.
350. **NCL licence type:** ISED will establish two distinct NCL licence types in the 3900 MHz band:
- low-power (LP) operations applicable to either metropolitan/urban or rural/remote Tier 5 service areas
 - medium-power (MP) operations applicable only in rural and remote Tier 5 service areas

These licence types are defined by the licence area covered. As shown in table 1 below, the maximum area size per licence for an LP operation is 15 km², while the maximum area size per licence for an MP operation area is 165 km².

Table 1: Area size limits and deployment requirements per NCL licence type

Licence type	Applicable area type	Area size per licence	Minimum number of base stations per licence
Low-power (LP)	Metropolitan, urban, rural, and remote Tier 5 service areas	Up to 15 km ²	1 LP
Medium-power (MP)	Rural and remote Tier 5 service areas	Minimum of 75 km ² , up to 165 km ²	1 MP

351. A licensee may apply for multiple NCL licences to cover its desired total area. There is no limit on the number of licences a licensee may hold. For example, to cover an area of 45 km², a licensee could apply for three LP licences with each licence covering 15 km² and must deploy at least one LP base station in each licence area. As a second example, to cover an area of 200 km², a licensee could apply for multiple LP licences or multiple MP licences or a combination of LP and/or MP licences, depending on the use case and power requirements. Licensees wanting to deploy MP systems must cover, at a minimum, 75 km².
352. At least one site at the authorized power level for the licence type must be deployed and used for radiocommunication (as defined in the *Radiocommunication Act*) for each licence issued. Further details regarding deployment requirements are provided in section 5.4.3.
353. As noted earlier, ISED will monitor the use of the 3900 MHz NCL licences and may implement additional (and immediate) measures should there be any spectrum warehousing or anti-competitive behaviour by licensees. ISED may request additional documentation to verify the deployment requirements.
354. **Spectrum bandwidth limit:** A spectrum limit would restrict the amount of 3900 MHz spectrum that a licensee can acquire in any given area. This would prevent a scenario where all 80 MHz ends up being held by one or two licensees, thereby restricting access to other users.
355. With the anticipated spectrum efficiencies that new 5G equipment will bring, ISED is of the view that a spectrum limit of 20 MHz would balance the importance of enabling the deployment of quality 5G applications with the objective of facilitating access for new users. As such, each NCL licensee will be limited to a maximum spectrum aggregation limit of 2 blocks of 10 MHz each within any geographic area. For example, if an operator holds a licence for 20 MHz in a certain area and applies for a new licence that overlaps the first licence geographically, the application would be rejected as 20 MHz would be exceeded in the overlapping area.
356. This spectrum limit applies to all NCL licensees. Any affiliated entities will be treated as a single licensee for the purposes of applying the spectrum limit and may not cumulatively hold more than the maximum value allowed. Any operator exceeding the spectrum limit will

face compliance measures. Further, should NCL licensees become affiliates after obtaining their licence, one of their NCL licences must be returned to ISED if the affiliates' combined holdings exceed the spectrum limit. An affiliated entity is defined as follows:

- **Affiliate:** An entity is an Affiliate of any other entity where it controls or is controlled, directly or indirectly, by the other entity, or is controlled, directly or indirectly, by any entity that also controls the first entity.

357. **Time limit measures:** While ISED recognizes the importance of facilitating access for spectrum users, it is also aware that licence area limits and spectrum bandwidth limits may not need to be in place indefinitely, particularly if spectrum remains unlicensed in some areas.

358. However, although it is expected that there will be a high demand for NCL licences in the 3900 MHz band, it is unknown how long it will take users to plan their business cases for using the spectrum. As such, ISED will not set a date for removing the licence area size limits or the spectrum limit at this time. Instead, ISED will monitor the demand for NCL licences and intends to conduct a review of the measures to support access to the 3900 MHz band three years from the date the first NCL licence in this band is issued.

Decisions

D36 ISED will implement licence area size limits based on licence types as described in table 1, with a deployment requirement of at least one base station at the appropriate associated power level per licence.

D37 ISED will implement a spectrum limit of 20 MHz per licensee within any geographic area.

6.3 Technical considerations for the 3900 MHz band

359. This section outlines the technical considerations for NCL licences operating in the 3900 MHz band.

6.3.1 Indoor versus outdoor NCL licensed operations

360. As noted in section 5.5.1, ISED sought comments on whether a distinction should be made between indoor and outdoor usage in NCL licensing bands so that different operators in the same overlapping area could be licensed on the same frequency block. As well, ISED sought comments on whether different technical rules should be applied based on indoor or outdoor operation and what interference mitigation measures should be implemented to enable their coexistence in such a scenario.

361. As further indicated in section 5.5.1 above, ISED will determine on a band-by-band basis certain technical considerations in relation to indoor versus outdoor NCL licensing. This section pertains to those applicable to the 3900 MHz band.
362. ISED also sought comments on the availability of equipment for NCL licences, especially if differentiation is needed on the type of equipment that would allow for the coexistence of indoor and outdoor NCL licensing applications in the same spectrum frequency bands in the same area.
363. If ISED should decide to allow indoor and outdoor NCL licensing to different operators in a band shared with other radiocommunication services, ISED sought comments on the general interference mitigation measures that could be implemented to enable band sharing.

Summary of comments

364. A general summary of comments in relation to the distinction between indoor and outdoor operation, availability of equipment, as well as interference mitigation measures is detailed in section 5.5.1. An additional summary of comments specific to the 3900 MHz band appears below.
365. **Availability of equipment:** Regarding equipment availability, Bell was of the view that the equipment ecosystem is in early stages of development. In terms of equipment intended specifically for indoor use, CanWISP, Qualcomm and TekSavvy indicated that 3GPP-based equipment for the 3900 MHz band does not currently exist, though is likely to become available as the equipment ecosystem evolves and demand increases. In its reply comments, CanWISP expressed that given the limited equipment ecosystem available in the 3900 MHz band, it is important for ISED to align the technical rules for the 3900 MHz NCL licensing band with those applicable to adjacent commercial mobile bands.
366. Electricity Canada noted that they were of the belief that 5G non-standalone (5G NSA) equipment in the 3.9 GHz band still requires an LTE control channel. This requirement could be removed with the availability of 5G standalone (SA) equipment, but until then, it is believed that there could be limitations on 5G deployments in NCL licensing in the 3.9 GHz band unless the operator has access to other LTE spectrum.
367. **Interference mitigation measures between co-located indoor/outdoor operations:** CanWISP and TekSavvy acknowledged that frequency coordination between indoor and outdoor NCL licensed networks in the 3900 MHz band may be challenging since radio signals at this frequency will penetrate through building walls. As noted earlier, to address this challenge, Motorola and Qualcomm suggested using band partitioning wherever possible for each operator or potentially further reducing the power levels for indoor operations, whereas Rogers and Sogetel proposed that, until studies demonstrate that indoor and outdoor NCL licensing applications can coexist, the indoor and outdoor systems should not have overlapping licences. Bell was of the view that it is too early to address indoor and outdoor sharing mechanisms given the equipment ecosystem is still in the early stages of

development. Meta proposed that ISED prioritize indoor deployments in order to better ensure coexistence, and that outdoor deployments be permitted, with mitigation measures, when they would not cause harmful interference to the indoor deployments.

Discussion

368. A general discussion in relation to the distinction between indoor and outdoor operation, availability of equipment, as well as interference mitigation measures is detailed in section 5.5.1. An additional discussion specific to the 3900 MHz band is provided below.

369. ISED is of the view that geographical overlap of indoor and outdoor usage would not be practical in the 3900 MHz band as the propagation loss alone would not be sufficient to mitigate interference, and significantly lower power levels proposed by some stakeholders for indoor operation in the 3900 MHz band would also not be pragmatic as it may not support a wide range of use cases. Therefore, ISED will not allow co-channel indoor and outdoor NCL licensing to different licensees operating in the same area using the 3900 MHz band.

370. ISED will monitor the development of the ecosystem for indoor and outdoor operations, including the integration of coexistence measures within products (e.g. contention-based protocol features) and may revisit the decision of not allowing indoor and outdoor NCL licensing in the same area on the same frequency block by different licensees in the future. Such change would be considered through revisions of ISED technical standards at the appropriate time.

371. ISED further acknowledges stakeholder comments about equipment availability in the 3900 MHz band and will take the comments into consideration when developing the technical rules.

Decision

<p>D38 ISED will not allow co-channel NCL indoor and outdoor licensing to different licensees operating in the same area using 3900 MHz spectrum at this time.</p>

6.3.2 Coexistence of NCL licensed systems

372. As noted in section 5.2.2, ISED sought comments on its proposal to not mandate specific technology solutions (e.g. TDD synchronization between systems) to address interference issues between NCL licensees, but to instead set technical rules to facilitate coexistence.

373. This section pertains to technical rules applicable to the 3900 MHz band.

Summary of comments

374. A general summary of comments in relation to coexistence between NCL licensees is detailed in section 5.5.2.

Discussion

375. As indicated in section 5.5.2 above, ISED does not intend to broadly impose technology specific coexistence techniques for all NCL licensing bands, including the 3900 MHz band. However, ISED may change the coexistence rules in the future if further information comes to light that would justify doing so. These changes would be implemented following technical consultations.

376. In addition, ISED recognises that there are equipment standards that cover the 3900 MHz band in support of FCC's initiative to expand flexible use in the 3.7 to 4.2 GHz band. In recognising the importance of the expected equipment ecosystem in the North American market and the opportunities that it enables for coexistence between operators, ISED encourages NCL licensees to deploy equipment that can be tuned across the entire NCL licensing spectrum in the 3900 MHz band. In the event that ISED requests that NCL licensees change frequencies, the above would facilitate continuity in access.

Decision

D39 ISED will not impose technology specific coexistence techniques in the 3900 MHz band at this time.

6.3.3 Adjacent band coexistence

377. In the Consultation, ISED sought comments on its proposal that adjacent band coexistence between potential NCL licensed operations in the 3900 MHz band and higher power flexible use operations in the 3800 MHz band be determined through an automated process.

378. ISED also sought comments on its proposal to align in principle with the mitigation measures described in the Standard Radio Systems Plan- SRSP-520, [*Technical Requirements for Fixed and/or Mobile Systems, Including Flexible Use Broadband Systems, in the Band 3450-3650 MHz*](#), to protect radio altimeters from flexible use operations but adapted to the proposed lower power levels prescribed in the applicable SRSP for NCL licensing in the 3900 MHz band.

Summary of comments

379. **Coexistence with 3800 MHz adjacent band operations:** Bell, Rogers and TELUS generally supported this proposal. Qualcomm also supported the proposal, pursuant to their recommended approach for running the automated analysis as described in section 5.5.2

above. Bell explained that an automated process would aid 3900 MHz operators to minimize potential interference cases to the adjacent band operations in the 3800 MHz band.

380. RABC was of the view that TDD synchronization in both the 3800 MHz and 3900 MHz would enable coexistence and recommended that ISED align adjacent band NCL licensing coexistence requirements with those applied to the adjacent commercial mobile bands. RABC's views were supported by Bell, CanWISP, Federated Wireless, Motorola, Qualcomm, Rogers, Teksavvy, TELUS and Xplore. Rogers added that in the case of synchronized networks, a guard band is not expected to be required but if ISED implemented a guard band to enable coexistence between adjacent operations, it should be wholly contained within the 3900 MHz band. Bell and TELUS also agreed with Rogers that if a guard band is necessary for coexistence, it should exist solely within the 3900 MHz band. Federated Wireless also supported TDD synchronization with an overarching spectrum access system for different TDD frame configurations.
381. TELUS noted that the mobile industry currently has an agreement to align TDD synchronization patterns for 3500 MHz, and the 3800 MHz band would likely follow suit. Rogers commented that although an automated tool would be beneficial, flexible use technical parameters (such as TDD synchronization patterns) in the 3800 MHz band will be largely determined by deployments along the US border where synchronization may be required, such as in the 3500 MHz band.
382. In addition, TELUS recommended that the NCL licence deployments also synchronize with the timing and frame patterns of the 3800 MHz band. In its view, this would facilitate the automated assessment process for adjacent band coexistence and result in fewer rejected applications. TELUS further recommended that NCL licensees that chose not to synchronize with the common standard TDD format would be restricted to equipment complying with the same Type 2 limits in Radio Standards Specification RSS-192, [*Flexible Use Broadband Equipment Operating in the Band 3450-3650 MHz*](#) (3500 MHz band) as for the equivalent 3900 MHz RSS standard. It indicated that the automated system proposed by ISED would compute coexistence based on the appropriate equipment specifications (such as OOB of Type 2 in the case of coordinated operations) and the base station operational parameters before issuing a licence.
383. CanWISP and TekSavvy suggested that, if coexistence requirements are implemented, the automated process should be applied equally to both 3800 MHz and 3900 MHz band operators. They further suggested that coordination agreements between operators should supersede the determination of an automated process.
384. Motorola suggested that coexistence can be achieved by establishing technical criteria such as adjacent channel interference protection ratios.
385. **Measures to protect radio altimeters in the 4200-4400 MHz band:** CanWISP, Ecotel, Teksavvy, Transport Canada and Xplore were generally supportive of ISED's proposal. Bell, CanWISP and Teksavvy indicated that if the power within the 3900 MHz band was limited that the measures should be adapted to reflect the lower power operations.

386. Bell recommended that ISED be guided by the results of the extensive testing ISED is doing with respect to the coexistence between 5G systems and radio altimeters. Bell also recommended that ISED engage the RABC to finalize the mechanism and parameters used by the automated system to ensure coexistence compliance. Additionally, Qualcomm recommended adjusting SRSP-520 in accordance with any policies ISED adopts resulting from the RABC working group on coexistence of radio altimeters and 5G systems. In its submission, RABC noted that studies and potential development of new technical rules are ongoing and will provide further response to any additional consultations on the matter. RABC noted that studies and potential development of new technical rules are ongoing and will provide an additional response to any additional consultations on the matter.
387. In addition to its support for the proposal, Transport Canada supported any further restrictions to enhance the safety of aviation operations, if necessary, for the band based on the outcome of ongoing ISED studies. Transport Canada acknowledged that it does not anticipate the measures to be permanent and that there will be an eventual transfer of responsibility to the aviation industry (e.g. implementation of filtering solutions, radio altimeter replacement campaigns) though that time frame could span a few more years.
388. Rogers noted that as the radio altimeter issue is still under discussion at RABC, it had no comment at this point related specifically to coexistence of NCL licensed operations with radio altimeters. However, Rogers reiterated its comments submitted to the 3800 MHz licensing consultation that it has concerns about the current constraints for the 3500 MHz band and believes them to be very conservative. Rogers supported ISED in continuing to work to determine whether even temporary constraints are required for the Canadian 3800 MHz band and what measures might be required for the NCL licensing 3900 MHz band.
389. Sogetel was of the view that no measures would be required. It noted that with ISED's commitment to monitor the evolution of the situation while international and domestic studies are being published, combined with the fact that there is still time before the band will be available for licensing, the situation will be resolved prior to the spectrum being available for the deployment of NCL licensed systems.

Discussion

390. **Coexistence with 3800 MHz adjacent band operations:** As stated in the Consultation, ISED recognizes that the higher power adjacent band operations in the 3800 MHz band (3650-3900 MHz) may create situations where NCL licensed users suffer interference. ISED is of the view that the likelihood is low for NCL licensed users being a source of interference to operations in the 3800 MHz band.
391. ISED acknowledges the proposal from stakeholders to align the TDD synchronization with the flexible use operation in the adjacent commercial mobile band. In addition, other mitigation measures such as site screening or other site engineering solutions can be used to manage potential interference between NCL licensing and adjacent band commercial mobile services. In the case of adjacent band coexistence, NCL licensees operating stations in the

block immediately adjacent to commercial mobile operations (i.e. block A1 of figure 1, 3900-3910 MHz) could likely operate successfully through coordination with relevant adjacent band commercial mobile operators. However, due to the nature of NCL licensing, ISED recognizes that coordination may not be as intuitive for some NCL licensees and could create unintended expectations of NCL licensees in relation to protection from interference. Thus, ISED will allow NCL licenses operating on frequency block A1 to be on a no-interference, no-protection basis, with respect to flexible use services in the 3800 MHz band. That is, any operation that contains block A1 (3900-3910 MHz) (e.g. NCL licensees that operate on channel block A1, or wider channels that include block A1) is also on a no-interference, no-protection basis, with respect to flexible use services in the 3800 MHz band. However, NCL licensees operating in block A1 are urged to work cooperatively with adjacent band flexible use licensees in the 3800 MHz band operating in close proximity, prior to deploying NCL licensed stations. NCL licenses operating on block A1 vis-à-vis other NCL licensed operations or services in the 3900 MHz are subject to the same licensing and technical rules.

392. **Measures to protect radio altimeters in the 4200-4400 MHz band:** Internationally, spectrum regulators, including ISED, have become aware of studies that have shown a possibility of interference to radio altimeters from signals outside their band of operation. This could include signals from future flexible use deployment of 5G systems operating below 4200 MHz, which include the NCL licensed operations in the 3900 MHz band.
393. ISED recognizes the importance of avoiding harmful interference to aeronautical radionavigation systems, particularly radio altimeters that are widely deployed in existing aircraft. In November 2021, ISED published the [*Decision on Amendments to SRSP-520, Technical Requirement for Fixed and/or Mobile Systems, Including Flexible Use Broadband Systems, in the Band 3450-3650 MHz, which included*](#) measures to protect radio altimeter operation from harmful interference from flexible use systems operating in the 3500 MHz band. Protective measures included the introduction of exclusion and protection zones to mitigate interference to aircraft around certain airport runways where automated landing is authorized and a national antenna down-tilt requirement to protect aircraft used in low altitude military operations, search and rescue operations, and medical evacuations all over the country. In December 2022, based on the outcome of ISED's technical studies, ISED initiated a consultation on [new mitigation measures](#) in the 3500 MHz and 3800 MHz bands to protect radio altimeters in the 4200-4400 MHz band. These proposed measures included revised exclusion and protection zones around airport runways, exclusion and protection zones around heliports, antenna down-tilt requirement outside large population centres and more stringent spurious emission limit for outdoor base stations in the 4200-4400 MHz range.
394. ISED has noted the proposal from stakeholders to adapt the technical rules for the protection of radio altimeters by taking into consideration the lower power levels for the 3900 MHz NCL licensed band. As such, ISED will develop appropriate interference mitigation measures on NCL licensed operations in the 3900 MHz band in order to protect radio altimeters in the 4200-4400 MHz band. As some of the stakeholders and Transport

Canada have noted, ISED will take into account the results of its studies and establish the technical rules in the 3900 MHz band accordingly.

Decisions

D40 NCL licences operating on block A1 (3900-3910 MHz) are on a no-interference, no-protection basis with respect to flexible use services in the 3800 MHz band.

D41 ISED will establish appropriate measures in the 3900 MHz band for NCL licensed operations to protect radio altimeters in the 4200-4400 MHz band through the development of relevant technical rules.

6.4 Early access application window for existing WBS licensees

395. As existing WBS operations in the 3650-3700 MHz band will be displaced, in accordance with ISED's [*Decision on the Technical and Policy Framework for the 3650-4200 MHz Band and Changes to the Frequency Allocation of the 3500-3650 MHz Band*](#) (the 3800 MHz Repurposing Decision), ISED recognizes that some WBS operators will be seeking to use the 3900 MHz band to maintain services. An early access application window for WBS licensees could allow these operators to continue offering service through a transition to the 3900 MHz band prior to their displacement deadline.

396. In the Consultation, ISED sought comments on two options related to providing WBS operators with early access to the 3900 MHz band:

- **Option 1 (all deployed stations):** An early access application window that would allow existing WBS licensees to apply for and hold 3900 MHz NCL licences in areas where they have deployed stations and have registered those stations as required by ISED.
- **Option 2 (rural and remote stations only):** An early access application window that would allow existing WBS licensees that have deployed stations in rural and remote areas, and have registered those stations as required by ISED to apply for and hold 3900 MHz NCL licences in those same areas.

397. ISED also sought comments on its proposal that, if an early access application window is applied, it be limited to WBS licensees that have submitted their deployment information to ISED within the timelines set out in the 3800 MHz Repurposing Decision, as per their condition of licence, and limited to areas where they have deployed.

398. Additionally, ISED sought comments on how long of a window ISED should provide to WBS operators to apply, and when any such window should be opened if early access is given.

Summary of comments

399. **Establishment of an early access application window:** Bell, CanWISP, Ecotel, Electricity Canada, Rogers, TekSavvy and TELUS all expressed support for Option 1, which would allow existing WBS licensees to obtain 3900 MHz NCL licences in all areas where they have already deployed stations.
400. TELUS further stated that it saw no reason to make a distinction of rural and remote stations over metropolitan and urban station if operators are providing service to Canadians. TELUS's position was echoed by Bell and Ecotel. CanWISP and TekSavvy mentioned the importance of ensuring that WBS licensees serving rural communities within urban Tier 5 areas also be given the ability to continue serving their customers.
401. CanWISP and TekSavvy were in agreement that early access licences should not overlap, wherever possible. However, as overlap will most likely be required in some situations, ISED should allow early access application 3900 MHz licences to overlap, with a requirement for frequency coordination between licensees in overlapping licence areas, while NCL licences issued after the early access application window should not be allowed to overlap.
402. Rogers recommended that ISED prioritize the transition of WBS licensees in urban areas, followed soon thereafter by licences in rural and remote areas. In its reply comments, Rogers expressed support for CanWISP's recommendation to open the early access window as soon as ISED releases the licensing policy.
403. Support for Option 2 was expressed by Dr. Gregory Taylor, recognizing the efforts of established WBS operators to provide service in rural and remote areas.
404. **Eligibility during an early access application window:** Bell, CanWISP, Ecotel, Rogers, TekSavvy, TELUS and Xplore were supportive of ISED's proposal that if an early access application window were applied, it should be limited to WBS licensees that have uploaded site information as required. Rogers argued that the proposal represents regulatory fairness and that licensees should not be rewarded for not meeting reporting obligations. Bell and Xplore further stated the importance of continuity of service for the customers of WBS licensees during their migration from the 3650-3700 MHz band.
405. TekSavvy and CanWISP further suggested that to be eligible for the early access application window, WBS operators should demonstrate that they are actively serving customers with each deployed station. CanWISP encouraged ISED to contact all WBS licensees to ensure that licensees are aware of their data upload requirements and associated deadlines, so that all WBS licensees can take advantage of the early access application window.
406. Meta argued that no preference should be given to any licence applicants and that ISED should promote and support all proponents that seek to develop infrastructure based on this spectrum.

407. **Duration of early access application window:** Stakeholders provided a number of suggestions on the duration of the early access application window. Electricity Canada recommended a one-year duration reserved for the spectrum and three years for the licensees to deploy. Ecotel and Xplore proposed early access windows of three months and six months, respectively. Bell suggested that the application process for WBS licensees should be six months with the process ending nine months prior to the displacement deadline, which would provide sufficient time for ISED to review the applications and for licensees to plan for their new licences. TELUS proposed that the early access application window should last for a period of at least 84 days regardless of area.
408. CanWISP and TekSavvy suggested that the early access application window commence upon publication of the licensing policy for the 3900 MHz band, closing prior to the WBS transition deadline.

Discussion

409. **Establishment of an early access application window:** In the Consultation ISED acknowledged that while some WBS operators may consider taking advantage of other spectrum options recently released by ISED, such as TV whitespace, 6 GHz, 5150-5250 MHz, and 5850-5895 MHz, some WBS operators may choose to continue their operations through the 3900 MHz NCL licensing band.
410. Comments received regarding an early access application window were largely in favour of the proposal and ISED has decided to establish an early access application window in the 3900 MHz NCL licensing band for displaced WBS.
411. Based on the data ISED received from WBS licensees, there are WBS operations deployed in metropolitan, urban, rural and remote Tier 5 service areas. This includes licensees that have deployed WBS in rural communities that fall within the boundaries of metropolitan and urban Tier 5 service areas as well as those that overlap multiple Tier 5 areas that are categorized differently. ISED recognizes that this could make it difficult for WBS licensees to apply for NCL licences that would cover their existing coverage areas if there is a restriction on the areas that are available for the early access window. Allowing existing WBS licensees to apply for early access 3900 MHz NCL licences in all areas where they have deployed stations would generally allow licensees to effectively provide continuity of service to Canadians, particularly in those rural and remote areas that rely on wireless access for broadband services.
412. As such, ISED will implement the early access application window for WBS licensees in all areas. This will afford all WBS licensees who have deployed and registered their stations with ISED the opportunity to apply for licences in the 3900 MHz band during a specified application window prior to opening the band for NCL licensing. However, ISED also notes that in some areas, in particular in metropolitan and urban areas, there could be a limitation on the amount of spectrum available to those applying in the early access application window due to multiple applications for spectrum within the same geographical area(s). In

certain areas, there is a potential that the demand for spectrum may exceed the supply. In such cases, ISED cannot guarantee that every WBS applicant will receive a licence.

413. Early access licensees will be required to meet the coexistence requirements with other radiocommunication services (e.g. FSS earth stations) in the 3800 MHz band, 3900 MHz band, and the adjacent 4000-4200 MHz band as specified in the relevant SRSP and future guidance. WBS licensees seeking to apply for early access NCL licences are encouraged to consult these documents for detailed requirements.
414. The NCL licensing structure and framework, including technical rules for the 3900 MHz band specifically, will apply to all operators participating in the early access application window, unless otherwise specified. ISED notes that licences spanning different area types (urban and rural) will be subject to the same rules as regular NCL licensed users, both in terms of fees and power levels. Multiple licences may be required based on the licence area size limit in section 6.2.
415. **Eligibility during an early access application window:** In order for any WBS licensee to be eligible to apply for an early access NCL licence through the early access application window, it must be in compliance with its WBS conditions of licence.
416. WBS licences in the 3650-3700 MHz band are for entire Tier 4 areas. However, the majority of WBS deployments do not cover the entire Tier 4 of their licence and in some cases WBS licensees have no stations deployed under their licence. In order to be eligible to apply for an NCL licence through the early access application window, WBS licensees must have deployed and registered their stations with ISED as per the WBS conditions of licence.
417. In addition, ISED would only allow WBS licensees to apply for NCL licence areas that encompass their existing WBS stations and the associated coverage areas. Applicants for early access licences may be required to demonstrate how the area requested falls within their current coverage area. WBS operators should note that any operation in the 3900 MHz band must be in accordance with specified power levels, antenna heights, and other technical rules as outlined in the forthcoming SRSP for NCL licensing operations and any other future guidance from ISED.
418. Limiting the early access window to areas where WBS licensees have registered and deployed stations will balance the needs of WBS licensees to plan for their displacement to maintain existing services, and the needs of new stakeholders seeking access to NCL licences for new services. ISED may also verify that WBS stations are in operation prior to granting an NCL licence in an area for a WBS licensee.
419. Licences in the WBS band (3650-3700 MHz) are for 25 MHz or 50 MHz of spectrum on an all-come, all-served basis. ISED notes that operators are expected to use spectrum issued via an NCL licensing process efficiently, through the deployment of modern and efficient equipment. ISED estimates that an operator using 50 MHz of spectrum in the WBS band would require 20 MHz in the 3900 MHz band to provide the same level of service with

newer equipment. As such the spectrum limit as established in section 6.2 is applicable to NCL licences applied for through the early access application window.

420. In addition, due to the overlapping nature of existing WBS systems, restrictions due to incumbents (e.g. FSS), the limited supply of spectrum, and uncertainty regarding the number of WBS licensees that will participate in the process, ISED cannot guarantee that all applications will be accommodated or have access to 20 MHz. However, a guiding objective of the early application window is to allow for the continuation of service by displaced WBS operators that choose to apply for NCL licences in the 3900 MHz band.
421. To assist with the achievement of this objective, applicants for early access licences should contact their existing neighbouring WBS licensees to discuss planned application areas and attempt to facilitate their mutual use of the 3900 MHz NCL licensing band wherever possible. ISED notes that WBS operators have been operating together for many years, and that this familiarity will help with such discussions.
422. In cases where there are multiple applicants for the same or closely neighbouring geographic areas, ISED will attempt to accommodate as many applications as possible in the area according to the technical rules that will be established for NCL operations in the band, noting that all valid applications for early access window licences submitted within the window will have equal priority. As with regular NCL licensees, ISED will expect continued cooperation among early access applicants that are granted licences.
423. During the intake period for the implementation of an early access application window, as shown in figure 2 below, there will not be any priority given based on order of submission of applications. ISED will collect all applications and at the end of the intake window will endeavor to accommodate as many applications as possible. Once an early access licence is issued, the early access licence will be the same as a regular NCL licence issued under the regular FCFS application process, with the same conditions of licence and technical rules.
424. ISED notes that the 3800 MHz Repurposing Decision imposed a moratorium for WBS licensees on new and modified stations in the Tier 5 areas listed in table E1 of annex E of that decision limiting operations to existing WBS stations that were uploaded to ISED's Spectrum Management System prior to December 25, 2020. The 3800 MHz Repurposing Decision did not limit new licences in rural and remote Tier 5 areas and did not restrict the deployment of new stations for existing and new WBS licensees who submitted an application regarding the use of the WBS spectrum prior to the publication of the 3800 MHz Repurposing Decision in the metropolitan and urban Tier 5 service areas. As such, WBS operators may have deployed new stations that were not captured in ISED's registration of stations prior to the 3800 MHz Repurposing Decision. ISED will allow a 60-day period following the publication of this Decision for all WBS licensees to upload their existing systems into ISED's Spectrum Management System and will apply to all service areas. All WBS licensees wanting to participate in the early access application window will be required to register all their WBS stations prior to this date including those that they have already registered.

425. After July 21st, 2023, only WBS licensees who have uploaded site information in the Spectrum Management System will be eligible to apply for NCL licences in the 3900-3980 MHz band through the early access applications window. In addition, applicants for a licence in this band must meet the eligibility condition of licence for this band as set out in annex B.
426. ISED notes that the window above applies only to those WBS licensees wishing to have early access to the 3900 MHz band. With regard to protection from flexible use operations in the 3800 MHz band for WBS operating in 3650-3700 MHz until the relevant transition deadline, the site upload information must have already been provided to ISED as specified in the 3800 MHz Repurposing Decision.

Decisions

- D42** ISED is adopting an early access application window, which will allow existing WBS licensees to apply for NCL licences in the 3900-3980 MHz band.
- D43** To be eligible to apply for NCL licences through the early access application window, a WBS licensee must be in compliance with its WBS conditions of licence and meet the eligibility requirements set out in annex B.
- D44** ISED will allow WBS licensees until July 21st, 2023, to upload their site information into ISED's Spectrum Management System. Only WBS licensees who have uploaded their site information up to this date will be eligible to apply through the early access application window.
- D45** During the early access application window, eligible WBS licensees may apply for NCL licences only in areas that encompass their existing uploaded WBS base stations and the associated coverage areas.
- D46** Unless otherwise specified, NCL licences granted through the early access window will be subject to the same technical requirements, conditions of licence and measures to support access that will be applied to all 3900 MHz NCL licences. See annex B for the conditions of licence for NCL licences in the 3900 MHz band issued through the early access application window.

6.4.1 General guidelines on the 3900 MHz band early access application window process for WBS

427. The following is a high-level summary of the 3900-3980 MHz band early access application window process for eligible WBS licensees. ISED will publish further guidance related to the early access application window on its website at a later date.
428. **Timing of the early access application window:** The 3800 MHz Repurposing Decision set a displacement deadline of March 31, 2025 for WBS stations in metropolitan and urban

Tier 5 service areas and March 31, 2027 for WBS stations in rural and remote Tier 5 service areas. ISED recognizes that WBS licensees in metropolitan and urban Tier 5 areas are already considering their plans for transition and will require time to procure equipment and complete system redesigns. As such, the early access application window timing should allow adequate time for ISED to complete application processing and give WBS licensees certainty with regards to their application for NCL licences prior to March 31, 2025.

429. The 3900 MHz band will be open to all applicants that meet the eligibility criteria. However, ISED recognizes that some WBS operators that are being displaced from the 3650-3700 MHz would be seeking to use the 3900 MHz band to maintain services, in particular in rural and remote areas. Therefore, ISED will open an early access application window for WBS licensees prior to the WBS displacement deadline of March 31, 2025, which would allow them time to plan to deploy new systems in the 3900 MHz band prior to their displacement date. The application window will allow eligible applicants to apply for a licence prior to the 3900 MHz band being made available to all other applicants. Stakeholders were in general agreement with this approach. Note that there may not be enough spectrum to accommodate all applicants in all areas.
430. Although WBS operators in rural and remote Tier 5 services areas are only required to transition out of the band by March 31, 2027, ISED will hold a single early access application window, occurring prior to the displacements in 2025. ISED is of the view that having multiple application windows would limit access to NCL licensing for those who do not currently have WBS deployments. In addition, a single application window will allow those WBS licensees serving a combination of urban and rural areas to apply for NCL licences that cover their existing deployments.
431. Given that ISED will only open one early access application window, WBS licensees with stations in rural and remote Tier 5 service areas should consider applying during the early access application window if they are seeking 3900 MHz NCL licences in the areas where they have deployed and registered WBS stations. However, it should be noted that all 3900 MHz NCL licences that are granted through the early access application window will be issued at the same time prior to ISED opening the 3900 MHz band for all applicants. As such, WBS licensees in all areas who receive licences through the early access application window will be subject to the NCL conditions of licence in the 3900 MHz, including the deployment requirement timelines.
432. The early access window must be completed prior to the commencement of the broader NCL licensing process for all other applicants and allow ISED sufficient time to review and analyze applications prior to approval. This will ensure that licence areas approved as part of the early access application window are entered into ISED's spectrum licensing system prior to the receipt of new applications under the general NCL licensing process.
433. As such, following a brief notification period, there will be a time limited early access application window, followed by an ISED analysis and clarification period, culminating with the issuance of licences prior to March 31, 2025. Issuing early access licences prior to March 31, 2025 will allow time for network set-up and testing for displaced WBS operators

to avoid a gap in service for clients. Exact timelines and further application requirements will be announced at a later date.

434. Following the early access application window, WBS licensees will continue to be able to apply for access to the 3900-3980 MHz band through the general NCL licensing process on an FCFS basis.
435. Figure 2 below provides applicants with a general summary of the early access window phases, while exact dates and timelines will be announced through the publication of future guidelines. Please consult the [ISED website](#) for the latest updates related to the WBS early access application window.

Figure 2: Phases for the implementation of an early access application window for NCL licences in the 3900-3980 MHz band

Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Notification	Intake	Analysis/Decision	Invoice/System Entry	Licence Issuance

Description of figure 2

Figure 2 is a timeline that identifies phases 1 to 5 of the early access window. Phase 1 is the notification period. Phase 2 is the intake period. Phase 3 is the analysis/decision phase. Phase 4 is the invoice/system entry phase. Phase 5 is the licence issuance period. A full explanation of these phases is provided in paragraphs 436 to 445.

436. **Phase 1, Notification:** ISED will notify all WBS licensees of the application process prior to the opening of the early access application window.
437. **Phase 2, Intake:** ISED will institute a time-limited intake period, during which it will accept applications. To ensure their applications are complete and subsequently considered, ISED encourages WBS licensees to submit their applications early in the intake period, if possible. This will afford ISED the time necessary to clarify any incomplete or erroneous data with applicants and ensure only complete applications are considered.
438. Although it is ISED’s intent that the broader NCL licensing process will take place under an automated system, in the case of the early access application window for the 3900-3980 MHz band, this will likely not be the case. As the early access application window may occur prior to the automated process being finalized, early access applicants may be required to submit their application via an online form.
439. As part of the submission, ISED considers it the responsibility of the applicant to demonstrate that the NCL licence area being applied for falls within their current WBS coverage area and to protect incumbent services following the rules in the relevant SRSP and transition manual. As such, applicants will also be required to provide ISED with detailed

information related to the application areas that conform to the NCL licence area limits, potentially including maps in the format specified by ISED.

440. **Phase 3, Analysis/Decision:** Once the application window has closed, ISED will analyse the applications and make licensing decisions. Applicants who request licence areas larger than their current service footprint will be rejected and will not be able to participate further in the early access application window process.
441. ISED will publish procedural information related to instances where two or more requests are received for spectrum in the same or neighbouring licence areas. Wherever possible, WBS licensees are encouraged to communicate with their neighbouring licensees (including licensees in same area) prior to application to discuss planned application areas and attempt to facilitate their mutual use of the 3900 MHz NCL licensing band wherever possible.
442. ISED will inform successful applicants of its decision to grant them a block of NCL licensed spectrum, including the amount of spectrum and the licence area, and that a licence will be issued once payment is received. Successful applicants will not be allowed to transmit in the 3900-3980 MHz band until they are issued a licence.
443. **Phase 4, Invoice/System Entry:** Following the conclusion of the analysis/decision phase, ISED will send invoices to successful applicants.
444. **Phase 5, Licence Issuance:** ISED will issue early NCL licences in the 3900 MHz prior to March 31, 2025, the first WBS displacement deadline, to those who have submitted payment for their licence. As discussed in section 6.3, ISED will issue all of these licences at the same time and unless otherwise stated, the NCL licences granted through the early access application window will be subject to the same technical requirements, conditions of licence, and measures to support access that will be applied to all 3900 MHz NCL licences.
445. Any future guidance will outline these restrictions.

7. NCL licensing in mmWave bands

446. ISED sought comments on its proposal to apply the NCL licensing framework to mmWave spectrum that is made available for non-competitive licensing through the [*Consultation on a Policy and Licensing Framework for Spectrum in the 26, 28 and 38 GHz Bands*](#).
447. Given ongoing uncertainty around potential use cases and deployments in the mmWave bands, ISED sought comments on the available equipment ecosystem and expected use cases for mmWave NCL licensing bands.
448. ISED proposed a phased implementation of the proposed NCL licensing bands. As discussed in section 6.2 above, some WBS licensees may be seeking access to the

3900 MHz band prior to the displacement timelines for the WBS band. As such, ISED proposed to prioritize the licensing of the 3900 MHz band by making it available for NCL licensing prior to making mmWave band NCL licensing available.

Summary of comments

449. **Apply NCL licensing framework to mmWave spectrum:** Dynamic Spectrum Alliance, ECN, Federated Wireless, and Qualcomm supported ISED's proposal to apply the NCL licensing framework to mmWave bands. Rogers supported the NCL licensing framework's being applied to mmWave spectrum in rural and remote areas where it can be expected that there will be limited auction demand.
450. Some respondents disagreed with an NCL licensing framework being applied to the 26, 28 and 38 GHz mmWave bands. Bell recommended that ISED only include the proposed 200 MHz in the 26 GHz band (26.5-26.7 GHz) and 50 MHz in the 28 GHz band (28.3-28.35 GHz) for NCL licensing. Bell proposed ISED auction spectrum from 37.6-40 GHz in the 38 GHz band to fully benefit from the US ecosystem and use cases, thus putting this spectrum to use more rapidly. TERAGO agreed with Bell, but suggested even more spectrum be reserved for the mmWave auction. TERAGO suggested that ISED reduce the spectrum allocated for NCL, while increasing the total amount of spectrum available by including the 24 GHz band in its plans for the upcoming mmWave auction. Sogetel suggested the number of blocks reserved for NCL licensing should be reduced by four in the 38 GHz band and the spectrum reserved for NCL in the 26-28 GHz band should be moved to the upper portion of the band, offering contiguous spectrum in blocks S, T and U (28.1-28.35 GHz).
451. Viasat was of the view that ISED should apply the NCL licensing framework to mid-band spectrum and, if necessary, to mmWave spectrum in the 26 and 38 GHz bands but not the 28.3-28.35 GHz band. SpaceX urged ISED not to make 28 GHz spectrum available for terrestrial assignment to ensure satellite operators can continue to provide critical services to end users across Canada but supported the use of a database-assisted light licensing model for mmWave spectrum. SES recommended that ISED consider whether NCL licensing in portions of the 28 GHz and 38 GHz can be better accommodated in other available spectrum (e.g. the 26 GHz band), without having to impair spectrum that is being productively used for satellite services today.
452. **Type of use envisioned for the mmWave bands:** Qualcomm and RABC strongly supported the proposal and believed it can support a variety of private and enterprise networks. ECN expected mmWave bands to be used mainly for mobility in denser areas or in exceptional circumstances where fixed wireless is preferable to fibre for delivery of telecom services such as the Internet. Similarly, Rogers expected mmWave bands to be used primarily in urban areas and specific high-traffic dense rural and remote areas.
453. CanWISP and TekSavvy expressed that the mmWave bands have the potential to support broadband access networks in small compact towns. Fixed wireless deployments in the mmWave bands may be built as an alternative to fibre access networks or may be built to

accelerate a broadband deployment in advance of constructing a fibre access network in a community or neighbourhood. Additionally, these respondents voiced how mmWave bands can support private networks in both indoor and outdoor scenarios. They anticipate that the use cases for mmWave in semi-rural connectivity projects will evolve in the coming years, and that restrictive measures on mmWave NCL licences will curtail the ability of operators to leverage the full potential of mmWave technologies in rural applications.

454. Viasat urged ISED to preserve mmWave spectrum in the 28 GHz band, including the critical 28.3-28.35 GHz band for satellite services, and only use 26 and 38 GHz for NCL licensed operations, whereas Xplore submitted that ISED should focus its immediate efforts on allocating the 3900 MHz band.
455. **Phased implementation of NCL licensing bands:** Many respondents agreed with ISED's proposal to phase the implementation of NCL licensing bands. Amazon, Bell, CanWISP, ISOC-ICI-Mozilla, Rogers, SES, Sogetel, TekSavvy, SpaceX, Viasat and Xplore were all in favour of prioritizing the 3900 MHz band prior to mmWave for NCL licensing. Viasat suggested that ISED preserve spectrum in the 28 GHz band for satellite services in the event that ISED decides to implement an NCL licensing regime for mmWave spectrum.
456. With regards to mmWave spectrum, Rogers and Sogetel proposed that ISED wait until after the mmWave auction or until the auctioned mmWave licences are useable to make NCL licences available in the band. Similarly, SES proposed that ISED consider a second consultation regarding the development of NCL licensing framework in the mmWave bands after the respective consultation and auction have closed to ensure better inputs and match licensing needs.
457. Qualcomm urged ISED to implement the mmWave NCL licensing process first since there are fewer coexistence issues to resolve in the mmWave band than in the 3900 MHz band.

Discussion

458. As discussed in the [*Consultation on a Policy and Licensing Framework for Spectrum in the 26, 28 and 38 GHz Bands*](#) (the mmWave Consultation), ISED proposed to make 250 MHz in the 26 GHz band, 50 MHz in the 28 GHz band and 800 MHz in the 38 GHz band available through a non-competitive spectrum licensing process to support new and innovative use cases.
459. ISED proposed to apply the proposed NCL licensing framework to high frequency bands, while recognizing that the amount and location of spectrum, if any, that will be made available for non-competitive licensing in mmWave is still under consultation.
460. ISED recognizes that while the global mmWave ecosystem for 5G New Radio (5G NR) bands n257, n258, n260 and n261 for the 26, 28 and 38 GHz bands has continued to develop in recent years, there remains uncertainty around use cases and deployments in the mmWave

bands. However, ISED is still of the view that mmWave NCL licensing could support different types of networks or combinations of networks, including localized mobile, fixed point-to-point and fixed wireless access services. As such, ISED will apply the NCL licensing framework to any mmWave spectrum that is designated as being available for non-competitive spectrum licensing in the decision resulting from the mmWave Consultation. In order to allow ISED to develop its software and technical rules for NCL licensing in the mmWave bands, ISED will generally lay out the high-level decisions related to the structure of the NCL licensing in this section. However, ISED will publish an addendum to this section in the future to set specific values where they cannot be determined until the amount of spectrum and specific blocks are announced in the decision resulting from the mmWave Consultation.

461. The NCL licensing framework is new and will require major changes to ISED’s spectrum management systems and processes. Therefore, ISED proposed a phased implementation of the NCL licensing bands. As discussed in the Consultation, WBS licensees will be provided access to the 3900 MHz band prior to the displacement deadlines for WBS operations. In addition, a decision on the amount of spectrum that will be available for NCL licensing in the mmWave bands is still pending. Given these factors, ISED is of the view that the priority and potential demand for the 3900 MHz band will initially be higher than demand for the mmWave bands. As such, ISED will prioritize the licensing of the 3900 MHz band by making it available for NCL licensing prior to making mmWave NCL licensing available.

Decisions

- D47** ISED will apply the NCL licensing framework described in section 5 to any mmWave spectrum that is designated as being available for NCL licensing in the decision resulting from the mmWave Consultation.
- D48** ISED will publish an addendum to this Decision to set any additional provisions for the NCL licences in the mmWave bands after the decision resulting from the mmWave Consultation is published.
- D49** ISED will phase the implementation of the NCL licensing and will make the 3900 MHz NCL licences available prior to making any mmWave NCL licences available.

7.1 Measures to support local access in the mmWave bands

462. In the Consultation, ISED sought comments on its proposal to apply measures to support access in the mmWave bands. ISED sought comments on applying an aggregate area limit of 5%-20% and a spectrum aggregation limit (cap) of 200 MHz in any Tier 5 service area. In addition, ISED sought feedback on limiting these measures for three years and asked if a longer duration would be desirable. ISED also sought comments on whether these measures should be different for metropolitan, urban, rural and remote Tier 5 service areas.

Summary of comments

463. Bell supported 20% of an aggregate area limit in any Tier 5 service area and a spectrum aggregation limit of 200 MHz. Rogers agreed with Bell's view that the limitation will prevent the formation of regional networks that could be used for wide area commercial mobile services.
464. Amazon supported ISED's proposal of a 5% geographic limitation and a 200 MHz spectrum cap in a given Tier 5 service area.
465. Xplore submitted that ISED should reject the use of spectrum caps and aggregate area limits in mmWave NCL licensing bands. Similarly, CanWISP did not support a spectrum cap applied to the mmWave bands but along with Teksavvy, encouraged the same cross band cap applied to adjacent bands. TekSavvy did not agree with any proposed aggregate area limits or spectrum caps in the case of mmWave bands and argued they would limit the serviceability of these bands for commercial broadband service providers and network operations.
466. Regarding the application of both aggregate area limits and spectrum cap measures, RAC proposed an initial spectrum aggregation limit to ensure access to the spectrum for all. If over a specified time frame of three years, for the remaining spectrum that is not licensed, RAC proposed that the aggregation limit could be raised to a higher level. Sogetel stated ISED should refrain from implementing restrictions to spectrum access, but if ISED elects to implement restrictions they should be time limited.
467. Amazon supported a three-year licence limit, conditional on use of spectrum. ECN stated a 200 MHz spectrum cap could be time limited to more than three years as usage of the spectrum is new. Xplore recommended licence terms be as long as those used in adjacent commercial mobile bands, or, as a minimum, five years.

Discussion

468. The measures that are applied to support local access in the mmWave bands may need to be adjusted depending on the amount of spectrum that is designated as being available for non-competitive local licensing in the decision resulting from the mmWave Consultation. However, ISED anticipates the considerations discussed in section 6.2 for the 3900 MHz band will also be relevant to the mmWave band NCL licences. As such, ISED will apply both licence area and spectrum aggregation measures to all mmWave NCL licences. Similar to the 3900 MHz band, ISED recognizes the potential drawbacks of aggregate area limits in the context of NCL licensing; thus, NCL licence area size limits, combined with associated power and deployment requirements will apply. Furthermore, ISED intends to use the same definitions and methodology as discussed in section 6.2 for the mmWave NCL licences. However, the licence area sizes will be adjusted to take into account the propagation characteristics of mmWave bands. Similarly, for the spectrum limit, ISED intends to use the same definitions as discussed in section 6.2 but the limit will be determined based on the amount of spectrum that is designated as being available for licensing in the decision

resulting from the mmWave Consultation. In addition, instead of establishing a specific duration for the above measures, ISED will monitor the NCL licensing uptake in mmWave bands with a view to adjusting these measures where appropriate.

469. ISED will publish an addendum to this Decision with the final set of measures that will apply to NCL licences after the decision resulting from the mmWave Consultation is published.
470. Although mmWave NCL licensing bands are close to mmWave bands being proposed to be auctioned, NCL licensing is not intended to be used as an extension of auctioned bands. ISED is of the view that implementing measures to support local access to the mmWave bands will promote a variety of users having access to the spectrum. ISED will monitor the use of the mmWave NCL licences and may implement additional measures should there be any spectrum warehousing or anti-competitive behaviour by licensees.

Decision

D50 ISED will apply licence area size limits and spectrum limits to all mmWave NCL licences. ISED will publish an addendum to this Decision with specific measures that will apply to mmWave NCL licences after the decision resulting from the mmWave Consultation is published.

7.2 Technical considerations for the mmWave bands

471. This section outlines the technical considerations of NCL licensed operations in the mmWave bands.

7.2.1 Indoor versus outdoor mmWave NCL licensed operations

472. In section 5.5.1, ISED sought comments on whether a distinction should be made between indoor and outdoor usage in NCL licensing bands so that different operators in the same overlapping area could be licensed on the same frequency. As well, ISED sought comments on whether different technical rules should be applied based on indoor or outdoor operation and what interference mitigation measures should be implemented to enable their coexistence in such a scenario.
473. ISED also sought comments on the availability of equipment for NCL licences, especially if differentiation is needed on the type of equipment that would allow for the coexistence of indoor and outdoor NCL licensing applications in the same spectrum frequency bands in the same area.
474. If ISED should decide to allow NCL licensed indoor and outdoor licensing to different operators in a band shared with other radiocommunication services, ISED sought comments

on the general interference mitigation measures that could be implemented to enable band sharing.

475. As indicated in decisions D17-D19 in section 5.5.1 above, ISED will determine on a band-by-band basis certain technical considerations in relation to indoor versus outdoor NCL licensed operations. This section pertains to those technical considerations applicable to the mmWave bands.

Summary of comments

476. A general summary of comments in relation to the distinction between indoor and outdoor operation, availability of equipment, as well as interference mitigation measures is detailed section 5.5.1. An additional summary of comments specific to the mmWave bands appears below.
477. With regards to equipment availability, Bell was of the view that the equipment ecosystem is in early stages of development. In terms of equipment intended specifically for indoor use, Qualcomm indicated that in the mmWave bands, both indoor and outdoor mobile wireless service equipment is currently available on the market for certain 3GPP bands, including n58 (24.25-27.5 GHz), n257 (26.5 GHz-29.5 GHz), n261 (27.5-28.35 GHz) and n260 (37-40GHz). CanWISP noted that indoor (non-ruggedized) equipment is more likely to be available in the mmWave bands.
478. Specific to the mmWave bands, Ecotel commented that interference mitigation in these bands between indoor and outdoor should not be of concern as the propagation characteristics offer means to address this in an easy manner.
479. CanWISP, Qualcomm and TekSavvy were of the view that a pfd limit at the licence area boundary would facilitate coordination in the mmWave bands. They added that indoor and outdoor equipment will either be based on 5G standards or will allow TDD frame synchronization to permit coordination with 5G equipment.

Discussion

480. A general discussion in relation to the distinction between indoor and outdoor operation, availability of equipment, as well as interference mitigation measures is detailed in section 5.5.1. An additional discussion specific to the mmWave bands is provided below.
481. ISED acknowledges stakeholder comments about equipment availability in the mmWave NCL licensing bands and will take the comments into consideration in the process of developing the technical rules. Recognizing the use cases in mmWave bands remain uncertain, ISED will continue to examine whether co-channel indoor and outdoor NCL licensing to different licensees in the same area would be feasible, taking into account factors including the propagation characteristics in these bands.

Decision

D51 ISED will defer the decision on whether to allow co-channel indoor and outdoor NCL licensing to different licensees in the same area in the mmWave bands.

7.2.2 Coexistence with other services

482. In the Consultation, ISED sought comments on its proposal to protect existing earth stations that have deployed prior to the mmWave bands being made available for NCL licensing at their current operating parameters. ISED also sought comments on its proposal to require re-authorization that would take into account any potentially impacted existing NCL licensed stations at the time, should these existing earth stations require modifications.
483. ISED further sought comments on the concept of an approach in the mmWave bands between proposed new NCL licensed operations and earth station operations such that once an earth station is authorized, the licensing software would authorize future NCL licensed stations in such a way that the existing authorized earth station would be protected. Similarly, existing NCL licensed stations would be protected from potential future licensed earth stations, based on specific technical measures to be established.
484. Additionally, ISED sought comments on any technical rules or sharing mechanisms (e.g. distance, power flux density, I/N ratio) that may be necessary to enable coexistence between NCL licensees and earth station operations in relevant bands, including those in the same band and in adjacent bands.
485. Finally, ISED sought comments on any technical rules or sharing mechanisms that may be necessary to enable coexistence between NCL licensed operations and other incumbents in the mmWave bands.

Summary of comments

486. **Protection of existing earth stations:** Amazon, Bell, CanWISP, Motorola, Qualcomm, Rogers, SES, Sogetel, SpaceX, TekSavvy and Viasat generally supported ISED's proposals.
487. Qualcomm suggested establishing a reasonable cut-off date, well before making the proposed bands available for NCL licensing, for deployed earth stations to be considered existing and thus protected at their authorized parameters. Qualcomm further suggested that protection measures should stay consistent with Canadian footnotes C47A, C47C and C51 in the [Canadian Table of Frequency Allocations](#); for instance, future earth stations should also protect existing NCL licensed deployment and in case of any identified issue, the affected licensees should be required to reach mutual agreement.
488. For modifications to existing earth stations, CanWISP and TekSavvy reiterated that such stations should be required to coordinate with any impacted NCL licensees since NCL licences are not associated with specific stations. Amazon similarly proposed allowing for

coordination in the event of failed technical analysis, as an automated tool may be too conservative; it further proposed earth stations be allowed to operate on a no-interference, no-protection basis to NCL licensed stations. Qualcomm suggested requiring modifications to earth stations to implement mitigation measures so as to avoid causing harmful interference to potentially impacted NCL licensed stations.

489. SES suggested that modified earth stations should not require re-authorization if they have no material impact on NCL licensed stations at the time. Viasat similarly disagreed with re-authorization needing to be sought for modifications to existing earth stations, noting the importance of the 28.3-28.35 GHz range to satellite services and the concentration of operations within this range.
490. **Concept of NCL licensing and earth station protection based on technical limits:** With regard to the concept of an approach in the mmWave bands in which the interference protection process between earth stations and the NCL licensed stations would be performed through an automated licensing software, Bell, Qualcomm, Rogers, SES and Sogetel indicated their support. Bell further proposed that RABC be engaged to finalize the mechanism and parameters used by the automated system to ensure coexistence compliance. SES proposed that if an earth station licensee operating within its licensed parameters experiences harmful interference from an NCL licensee, even if the automated tool determined that there should be no interference, the earth station licensee should still have recourse to coordinate with the NCL licensee supported by procedures established by ISED.
491. Federated Wireless proposed the use of dynamic spectrum access to manage coexistence between the NCL licensed systems and earth stations in the mmWave bands, similar to what currently occurs with the spectrum access system in the CBRS band and what is being proposed in the US for the co-primary Federal and non-Federal systems in the 37 GHz band.
492. SpaceX supported an automated compatibility analysis to ascertain coexistence between NCL licensed operations and satellite earth station operations in the mmWave bands and suggested adopting a modified version of the FCC's 70/80 GHz self-coordinated light-licensing framework, where both NCL and satellite licensees apply for new ground infrastructure through a common database that performs automated coexistence analysis.
493. Motorola recommended that when modelling interference to existing earth stations, realistic propagation models and detailed antenna pattern data for both ends of the link should be used. SpaceX similarly suggested that any automated coexistence analysis should take into consideration real-world factors, including clutter loss and localized elevation data, to provide an accurate assessment of interference risk, while urging ISED not to reject applications on the basis that the station or system may cause or receive harmful interference. Instead, earth stations could be authorized subject to a coordination condition or could permit earth station deployment on a non-interference basis with respect to those impacted sites.
494. **Technical rules for sharing mechanisms:** In response to comments sought on technical rules or sharing mechanisms (such as distance, power flux density, I/N ratio) that may be

necessary to enable coexistence between NCL licensed operations and earth station operations in relevant bands, including those in the same band and in adjacent bands, stakeholders presented various options.

495. Bell emphasized that existing earth stations that have deployed prior to the mmWave bands being made available for NCL licensing be protected at their current operating parameters and that future technical compatibility between earth stations and systems using mmWave NCL licences be performed by an automated process.
496. Qualcomm, Rogers, SES and Sogetel generally supported the use of a pfd limit as a coexistence mechanism. Rogers and SES added that this would enable coexistence between NCL licensees and earth stations and would also align with the FCC approach.
497. Motorola suggested that reasonable interference protection ratios for earth stations should be utilized, such as an I/N ratio of -6 dB, since this would also be consistent with incumbent protection standards used by the FCC for military radar in the US.
498. In its reply comments, SpaceX recommended the adoption of a sharing mechanism that accurately measures harmful interference risks to maximize coexistence between co-primary services and to promote competition and efficient use of spectrum. Furthermore, it suggested the use of an I/N ratio, such as -12.2 dB, which is more realistic and accurate than a pfd contour. It added that the use of e.i.r.p. toward the horizon, as prescribed in the International Telecommunication Union (ITU) *Radio Regulations*, would aid in determining potential harmful interference risk from a satellite earth station into an NCL licensed station since this is the most likely interference scenario. SpaceX opposed stringent minimum separation distances or exclusion zones that could unnecessarily restrict the deployment of satellite earth stations. Instead, it suggested that the interference risk between co-primary systems could be accurately modelled and parties should be encouraged to coordinate in good faith.
499. CanWISP and TekSavvy proposed a 10 km buffer zone around existing licensed earth stations where NCL licences in selected mmWave bands are not issued.
500. **Technical rules for coexistence between NCL licensees and other users:** With regard to the technical rules for sharing mechanisms that may be necessary to enable coexistence between NCL licensed operations and other users in relevant bands, stakeholders provided various views. For example, CanWISP and TekSavvy proposed that the technical rules and coordination requirements applied to the NCL licensed bands be equivalent to the rules and requirements in adjacent licensed bands to facilitate coexistence between operators.
501. Qualcomm encouraged ISED to adopt Qualcomm's proposed technology-neutral, equipment-based sharing approach that they have proposed in the US for the Lower 37 GHz band (37.0-37.6 GHz). In particular, Qualcomm proposed that ISED adopt a sharing approach for most of the mmWave NCL licensing bands (including portions of the 26 GHz and 38 GHz bands) where each NCL licensee is granted priority rights to a single channel (e.g. 50 or 100 MHz wide) and secondary rights to the rest of the block, enabling much higher spectrum utilization and spectral efficiency. Qualcomm indicated that spectrum

access on a secondary basis would be dynamically managed by implementation of a sensing capability incorporated into the equipment. Qualcomm further noted that secondary operations on a priority licensee's channel would be permitted so long as the sensing equipment determines it will not interfere with the priority licensee.

502. Rogers proposed that a pfd below a maximum threshold be the primary mechanism used to determine coexistence eligibility between NCL licensed operations and other users in relevant bands, irrespective of the NCL licensed bands or adjacent band.
503. Sogetel noted that if ISED adopts custom vector-based service areas, collaboration between licensees to solve interference issues that might arise will be sufficient to enable coexistence between NCLs and other users in relevant bands.
504. In its reply comments, TELUS recommended that ISED implement an automated assessment process for coexistence that would reject applications that cannot coexist with adjacent band services. TELUS recommended in its comments and reiterated in its reply comments that coexistence should be facilitated through the adoption of a common frame structure for TDD synchronization for the mmWave NCL licensed bands, or via the use of one or more mitigation techniques (e.g. guard bands within NCL licensed bands, filtering, site shielding of NCL licensed deployments).

Discussion

505. **Protection of existing earth stations:** There are currently no licensed earth stations in the 26.5-26.7 GHz and 37.6-38.4 GHz bands. However, there are currently transmitting FSS earth stations in operation in the 28.3-28.35 GHz band. Additional earth stations may continue to be licensed in these bands. Therefore, ISED agrees that earth stations existing prior to the mmWave bands being released for NCL licensing should be protected at the parameters at which they were licensed. Information regarding licensed earth stations is available from ISED's Spectrum Management System, including the authorization date for earth station site approvals; therefore, a cut-off date would not be required to clarify the specific earth stations that are already in operation before the mmWave bands are made available to NCL licensing.
506. Once the mmWave bands are opened for NCL licensing, consistent with an FCFS licensing approach, NCL licensing assignments would be automated and assignments would take into account interference potential with other systems and services already deployed based on their parameters on record. Should these parameters be modified at a later time, it could result in a change to the interference environment by impacting NCL systems that have since been deployed. As such, any proposed modifications to an existing earth station would be assessed based on the interference environment at the time the proposed changes are submitted to determine if the modification could be approved.
507. Consequently, as originally proposed, ISED will protect earth stations existing prior to the release of these bands for NCL licensing operations but will require any proposed

modifications to such earth stations to be evaluated and authorized before they can be implemented.

508. **Technical rules for coexistence of NCL licensed operations and earth station operations:** NCL licensing assignments made using automated tools would not require station information up front; however, the automated assignment tool would model a conservative interference analysis to existing earth stations using widely accepted propagation models to compute interference scenarios.
509. Operator-to-operator coordination agreements typically involve a very limited number of parties who are well versed in the coordination process. In the context of the proposed NCL licensed operations in the mmWave bands, some NCL licensees may not have prior coordination experience and face challenges coordinating between NCL licensees and earth station operations in order to establish mutually acceptable agreements. Stakeholders are in agreement with ISED that, instead of operator-to-operator coordination agreements, access to the mmWave NCL licensing bands be based on technical coexistence analysis performed through an automated process that will take into account the custom vector-based service areas of NCL licensees and the earth station locations. The automated process will facilitate coexistence of both earth stations and NCL licensed stations and will take into account licensed earth stations in the same band as well as in adjacent bands. Further, new earth station applications will be assessed against existing licensed earth stations and NCL licensed incumbents in the band. The coexistence approach to be adopted will take into account decisions already adopted through SLPB-003-19, [*Decision on Releasing Millimetre Wave Spectrum to Support 5G*](#). Furthermore, should existing earth stations require modifications, such modifications would have to be evaluated and authorized taking into account any potentially impacted existing NCL licensed stations at the time the proposed modifications are submitted.
510. With respect to the technical mechanisms (e.g. distance, power flux density, I/N ratio) to enable coexistence between NCL licensed operations and earth station operations, stakeholders presented different views recommending all three options of distance, power flux density, and I/N ratio. Following this Decision, ISED will develop the technical rules for coexistence between mmWave NCL licensed operations and earth station operations through consultation. ISED will take into account the comments submitted as part of the NCL licensing consultation when developing these technical rules.
511. In response to stakeholder proposals concerning dynamic sharing mechanisms, ISED does not intend to allow such spectrum sharing for any of the NCL licensing bands at this time, as FCFS licensing has been decided as the best approach for the NCL licensing bands.

Decisions

D52 ISED will protect earth stations existing prior to the mmWave bands being released for NCL licensing at the parameters at which they were licensed. In the event that a satellite operator would want to modify an existing earth station, the proposed modified earth station would be assessed based on the interference environment at the time the proposed changes are submitted to determine if the modification could be approved.

D53 ISED will adopt an automated coexistence approach in the mmWave bands between new NCL licensed operations and existing earth station operations. Once an earth station is authorized, the automated licensing software would authorize future NCL licences in such a way that existing earth stations would be protected, based on technical rules to be established. Similarly, once an NCL licence is granted, the automated licensing software would authorize future earth stations in such a way that the NCL licensed operation would be protected, based on technical rules to be established. The coexistence approach to be adopted will take into account decisions already adopted through the [Decision on Releasing Millimetre Wave Spectrum to Support 5G](#).

8. Obtaining copies

512. All ISED publications related to spectrum management and telecommunications are available on the [Spectrum Management and Telecommunications](#) website.
513. For further information concerning the process outlined in this document or related matters, contact:

Innovation, Science and Economic Development Canada
Spectrum Regulatory Policy
Senior Director
6th Floor, East Tower
235 Queen St
Ottawa ON K1A 0H5

Telephone: 613-219-5436

TTY: 1-866-694-8389

Email: spectrumauctions-encheresduspectre@ised-isde.gc.ca

Annex A: Basis for the conditions of licence for non-competitive local licences

The following conditions will apply to non-competitive local (NCL) licences, subject to any additions or amendments that may be established in any band-specific frameworks.

It should be noted that the licences are subject to the relevant provisions in the *Radiocommunication Act* and the *Radiocommunication Regulations*, as amended from time to time. For example, the Minister of Innovation, Science and Industry (the Minister) continues to have the power to amend the terms and conditions of spectrum licences, under paragraph 5(1)(b) of the *Radiocommunication Act*. The Minister may do so for a variety of reasons, including furtherance of the policy objectives related to the band. Such action would normally only be undertaken after consultation.

A1. Licence term

If this licence is renewable: This licence will expire on March 31 each year. Licensees have a high expectation that a new licence will be issued for a subsequent annual term, upon payment of the relevant fee, unless a breach of licence condition has occurred, a fundamental reallocation of spectrum to a new service is required, or an overriding policy need arises.

If this licence is temporary: This licence expires on the date set out on its face and is not renewable.

A2. Eligibility

The licensee must comply on an ongoing basis with the applicable eligibility criteria in subsection 9(1) of the *Radiocommunication Regulations*.

A3. Fees

Licences obtained through the NCL licensing process will be subject to the licence fees established for the applicable band.

A4. Licence transferability, divisibility and subordinate licensing

This licence is not transferable in whole or in part and cannot be divided or subordinated.

A5. Radio station installations

The licensee must comply with Client Procedures Circular CPC-2-0-03, *Radiocommunication and Broadcasting Antenna Systems*, as amended from time to time.

Provision of technical information: The licensee must provide and maintain up-to-date technical information on a particular station or network in accordance with the definitions, criteria, frequency and timelines specified by Innovation, Science and Economic Development Canada (ISED) in any instrument or decision resulting from the *Consultation on Amendments to Requirements for Spectrum Licensees to Submit Technical Information about Sites*.

Compliance with legislation, regulation and other obligations: The licensee is subject to and must comply with the *Radiocommunication Act* and the *Radiocommunication Regulations*, as

amended from time to time. The licensee must use the assigned spectrum in accordance with the *Canadian Table of Frequency Allocations* and the spectrum policies applicable to this band, as amended from time to time. The licence is issued on condition that all representations made in relation to obtaining this licence are all true and complete in every respect.

A6. Lawful interception

A licensee operating as a telecommunications common carrier using the spectrum for voice telephony systems must, from the inception of service, provide for and maintain lawful interception capabilities as authorized by law. The requirements for lawful interception capabilities are provided in the Solicitor General's Enforcement Standards for *Lawful Interception of Telecommunications* (Rev. Nov. 95). These standards may be amended from time to time.

The licensee may request the Minister to forbear from enforcing certain assistance capability requirements for a limited period of time. The Minister, following consultation with Public Safety Canada, may exercise the power to forbear from enforcing a requirement or requirements where, in the opinion of the Minister, the requirement is not reasonably achievable. Requests for forbearance must include specific details and dates indicating when compliance with the requirement can be expected.

A7. Deployment requirements

The licensee is required to demonstrate to the Minister, through site upload information, that the spectrum has been put to use to serve all of the licence area within two years of the initial licence issuance date. Only stations that are actively being used for radiocommunication (as defined in the *Radiocommunication Act*) shall be considered valid deployments for the purposes of meeting this condition.

Specific deployment requirements will be set out on a band-by-band basis as specified by ISED.

The licensee is required to meet these conditions at all relevant times during the licence term and to continuously provide services throughout the term of the licence in accordance with these requirements.

The licensee must provide the Minister with any documentation or information related to deployment at the Minister's request.

NCL licensees may deploy base stations anywhere within their licence areas. However, NCL licensees must not transmit to devices and/or receivers outside of their licence areas.

This condition does not apply to temporary licences of less than one year's duration.

A8. Reporting

Upon request from ISED, licensees must provide information to the Minister, including but not limited to:

- a statement indicating continued compliance with all conditions of licence
- an update on the implementation and spectrum usage within the area covered by the licence
- other information related to the licence as specified in any notice updating the reporting requirements as issued by the Minister

All reports and statements are to be certified by an officer of the company and submitted, in writing, within the time frame set out in the request. Confidential information provided will be treated in accordance with subsection 20(1) of the [Access to Information Act](#).

Reports are to be submitted to the Minister at the following address:

Innovation, Science and Economic Development Canada
Spectrum Management Operations Branch
Manager, Operations
6th Floor, East Tower
235 Queen St
Ottawa ON K1A 0H5

A9. Technical considerations and coordination

The licensee must comply on an ongoing basis with the technical aspects of the appropriate Radio Standards Specifications (RSS) and Standard Radio System Plans (SRSP), as amended from time to time.

The licensee must comply with the obligations arising from current and future frequency coordination agreements established between Canada and other countries and shall be required to provide information or take actions to implement these obligations as indicated in the applicable SRSP.

A10. Mandatory antenna tower and site sharing

The licensee must comply with the applicable mandatory antenna tower and site sharing requirements set out in CPC-2-0-17, [Conditions of Licence for Mandatory Roaming and Antenna Tower and Site Sharing and to Prohibit Exclusive Site Arrangements](#), as amended from time to time.

A11. Amendments

The Minister retains the discretion to amend these terms and conditions of licence at any time.

Annex B: Conditions of licence for non-competitive local licences in the 3900-3980 MHz band

The following conditions will apply to non-competitive local (NCL) licences in the 3900-3980 MHz band.

It should be noted that the licences are subject to the relevant provisions in the *Radiocommunication Act* and the *Radiocommunication Regulations*, as amended from time to time. For example, the Minister of Innovation, Science and Industry (the Minister) continues to have the power to amend the terms and conditions of spectrum licences, under paragraph 5(1)(b) of the *Radiocommunication Act*. The Minister may do so for a variety of reasons, including furtherance of the policy objectives related to the band. Such action would normally only be undertaken after consultation.

B1. Licence term

If this licence is renewable: This licence will expire on March 31 each year. Licensees have a high expectation that a new licence will be issued for a subsequent annual term, upon payment of the relevant fee, unless a breach of licence condition has occurred, a fundamental reallocation of spectrum to a new service is required, or an overriding policy need arises.

If this licence is temporary: This licence expires on the date set out on its face and is not renewable.

B2. Eligibility

The licensee must comply on an ongoing basis with the applicable eligibility criteria in subsection 9(1) of the *Radiocommunication Regulations*.

B3. Restriction on commercial mobile service providers

Any entity, or affiliate of that entity (as defined in section 6.2 of SPB-001-23, *Decision on a Non-Competitive Local Licensing Framework, Including Spectrum in the 3900-3980 MHz Band and Portions of the 26, 28, and 38 GHz Bands*), with 100,000 or more retail mobile phone subscribers as reported to the CRTC through its Annual Telecommunications Survey is ineligible to hold this licence for the blocks from 3940 MHz to 3980 MHz in the 3900 MHz band.

B4. Fees

Licences obtained through the NCL licensing process as described in SPB-001-23, *Decision on a Non-Competitive Local Licensing Framework, Including Spectrum in the 3900-3980 MHz Band and Portions of the 26, 28 and 38 GHz Bands*, will be subject to licence fees established for this band in that Decision.

B5. Licence transferability, divisibility and subordinate licensing

This licence is not transferable in whole or in part and cannot be divided or subordinated.

B6. Bandwidth limit

Any licensee, including affiliates of that licensee, may not hold licences in an area where their aggregate bandwidth exceeds 20 MHz. For the purposes of this condition, an affiliate is any other entity where it controls or is controlled, directly or indirectly, by the other entity, or is controlled, directly or indirectly, by any entity that also controls the first entity. Further, should the licensee become an affiliate with another licensee in the 3900 MHz band after the issuance of this licence, one of the affiliates' licences, as chosen by the affiliates, must be returned to Innovation, Science and Economic Development Canada (ISED) if the affiliates' combined holdings exceed 20 MHz.

B7. Radio station installations

The licensee must comply with Client Procedures Circular CPC-2-0-03, *Radiocommunication and Broadcasting Antenna Systems*, as amended from time to time.

Provision of technical information: The licensee must provide and maintain up-to-date technical information on a particular station or network in accordance with the definitions, criteria, frequency and timelines specified by ISED in any instrument or decision resulting from the *Consultation on Amendments to Requirements for Spectrum Licensees to Submit Technical Information about Sites*.

Compliance with legislation, regulation and other obligations: The licensee is subject to and must comply with the *Radiocommunication Act* and the *Radiocommunication Regulations*, as amended from time to time. The licensee must use the assigned spectrum in accordance with the *Canadian Table of Frequency Allocations* and the spectrum policies applicable to this band, as amended from time to time. The licence is issued on condition that all representations made in relation to obtaining this licence are all true and complete in every respect.

B8. Lawful interception

A licensee operating as a telecommunications common carrier using the spectrum for voice telephony systems must, from the inception of service, provide for and maintain lawful interception capabilities as authorized by law. The requirements for lawful interception capabilities are provided in the Solicitor General's Enforcement Standards for *Lawful Interception of Telecommunications* (Rev. Nov. 95). These standards may be amended from time to time.

The licensee may request the Minister to forbear from enforcing certain assistance capability requirements for a limited period of time. The Minister, following consultation with Public Safety Canada, may exercise the power to forbear from enforcing a requirement or requirements where, in the opinion of the Minister, the requirement is not reasonably achievable. Requests for forbearance must include specific details and dates indicating when compliance with the requirement can be expected.

B9. Deployment requirements

The licensee will be required to demonstrate to the Minister, through site upload information, that the spectrum has been put to use within two years of the initial licence issuance date to the levels set out in the *Decision on a Non-Competitive Local Licensing Framework, Including Spectrum in the 3900-3980 MHz Band and Portions of the 26, 28 and 38 GHz Bands*. Only stations that are actively being used for radiocommunication (as defined in the Radiocommunication Act) shall be considered valid deployments for the purposes of meeting this condition.

The licensee is required to meet these conditions at all relevant times during the licence term and to continuously provide services throughout the term of the licence in accordance with these requirements.

The licensee must provide the Minister with any documentation or information related to deployment at the Minister's request.

This condition does not apply to temporary licences of less than one year's duration.

NCL licensees may deploy base stations anywhere within their licence areas. However, NCL licensees must not transmit to devices and/or receivers outside of their licence areas.

B10. Reporting

Upon request from ISED, licensees must provide information to the Minister, including but not limited to:

- a statement indicating continued compliance with all conditions of licence
- an update on the implementation and spectrum usage within the area covered by the licence
- other information related to the licence as specified in any notice updating the reporting requirements as issued by the Minister

All reports and statements are to be certified by an officer of the company and submitted, in writing, within the time frame set out in the request. Confidential information provided will be treated in accordance with subsection 20(1) of the [Access to Information Act](#).

Reports are to be submitted to the Minister at the following address:

Innovation, Science and Economic Development Canada
Spectrum Management Operations Branch
Manager, Operations
6th Floor, East Tower
235 Queen St
Ottawa ON K1A 0H5

B11. Technical considerations and coordination

The licensee must comply on an ongoing basis with the technical aspects of the appropriate Radio Standards Specifications (RSS) and Standard Radio System Plans (SRSP), as amended from time to time.

The licensee must comply with the obligations arising from current and future frequency coordination agreements established between Canada and other countries and shall be required to provide information or take actions to implement these obligations as indicated in the applicable SRSP.

If this licence pertains to spectrum in the 3900-3910 MHz, it is issued on a no-interference no-protection basis, vis-à-vis adjacent band flexible use operations in the 3650-3900 MHz band.

B12. Mandatory antenna tower and site sharing

A licensee that is using this spectrum as a telecommunications common carrier, as defined in the [*Telecommunications Act*](#), must comply with the mandatory antenna tower and site sharing requirements set out in CPC-2-0-17, [*Conditions of Licence for Mandatory Roaming and Antenna Tower and Site Sharing and to Prohibit Exclusive Site Arrangements*](#), as amended from time to time.

B13. Mandatory roaming

A licensee that is using this spectrum as a telecommunications common carrier, as defined in the *Telecommunications Act*, must comply with the roaming requirements set out in CPC-2-0-17, as amended from time to time.

B14. Amendments

The Minister retains the discretion to amend these terms and conditions of licence at any time.