

**ATTACHMENT
RESPONSE TO CONSULTATION QUESTIONS – SMSE-010
Yukon Government**

4-1. What is the general need for additional commercial mobile spectrum at this time and what do you anticipate the future needs to be?

1. The Yukon believes that, in general, additional commercial mobile spectrum is needed in order to promote and sustain growth in the provision of commercial wireless broadband services and supports the Department's stated intention to make 700 MHz commercial spectrum available via auction.

2. However, Yukon Gov. Protective Services strongly believes that a portion of the 700 MHz band should be assigned for public safety and public service use in order to provide dedicated capacity for mission-critical data applications used to support emergency response operations. This spectrum should not be allocated via auction but should be directly licensed to the public safety community.

3. We believe that the 700 MHz band is particularly suited to the geographic and demographic situation outside urban areas in Yukon (mountainous terrain, low population, and long distances between population centres) due to its favourable propagation characteristics in comparison to 2500 MHz band. For this reason, our response focuses on the 700 MHz band.

4-2. Provide general deployment information on the current use of your existing holdings in each mobile spectrum band. In the case where current holdings are not being used, provide information on its planned use, including timelines.

5. The Yukon does not have existing spectrum holdings in any of the bands referenced in the consultation paper.

6. The following Yukon ministries, public safety and public service organizations in Yukon hold spectrum licenses (VHF and UHF) used to support Land Mobile Radio systems providing mission-critical voice and narrowband data services:

- Yukon Ambulance Service
- RCMP
- Emergency Measures Organization
- Protectice Services – Fire Marshal's Office, Wildland Fire
- Dept of Justice - Corrections
- Environment
- Highways and Public Works
- Local Fire Departments
- Yukon Energy Commission
- Whitehorse City Transit
- Volunteer Search and Rescue Teams
- Local Authority Emergency Programs

7. In addition, a number of federal departments and agencies operating in Yukon hold similar licenses for public safety radio systems (CBSA, Coast Guard/DFO, Transport Canada, etc.).

8. It is our view that current spectrum holdings by public safety agencies in Yukon are not suitable for deployment of mission-critical wireless **broadband** services and new allocations must be made.

4-3. Indicate your need for additional spectrum for commercial mobile service applications and how much spectrum is required.

10. Larger carriers who are capable of providing many advanced broadband services, require enough spectrum to meet current and future demand. The majority of this spectrum is required in urban areas where the demand is greatest. Larger carriers have requirement for spectrum in these areas for possible future service deployment but the amount of spectrum is lower than in urban areas. The deployment timelines in rural and remote areas may also be much longer than in urban areas due to challenges such as shortened build seasons, land acquisition, and confirming a customer base to build a profitable business case for deployment.

(a) What deployment timelines are being considered?

11. The Yukon has no comment at this time.

(b) What types of applications/uses are envisioned?

12. The Yukon has no comment at this time.

(c) To what degree will your businesses anticipated spectrum needs be addressed by having access to the 700 MHz and/or 2500 MHz spectrum?

13. The Yukon has no comment at this time.

4-4. Do you plan to use 700 MHz spectrum acquired in the auction with, or on behalf of, another entity, which may participate in the auction? If yes, with which entity?

14. The Yukon has no comment at this time.

4-5. Provide comments on the extent to which alternate spectrum access arrangements have been investigated/considered to respond to your need for additional spectrum. In addition, provide specific efficiency measures investigated or implemented for current holdings.

Your comments to the above questions will be considered proprietary and will remain confidential. Responses to these questions must be submitted separately (e.g., in an appendix) and clearly marked as "Confidential."

15. The Yukon has no comment at this time.

5-1. Based on the criteria listed above, which of the four band plan options should be adopted in Canada? Why is this option preferred over the other options? If Option 3 (APT band plan) is selected, what should the block sizes be? In providing your responses, include supporting arguments, including potential benefits to wireless subscribers.

16. The Yukon advocates Option 1 – “Harmonize with the U.S. band plan”, with the additional allocation of the upper 700 band “D” block to public safety, yielding a total public safety assignment of 20 MHz (2 x 10 MHz).

17. We support the Department’s view that the 700 MHz band plan should enable:

1. Harmonization of equipment specifications to the extent possible, enabling economies of scale and greater equipment availability for consumer and infrastructure equipment, and;
2. Cross-border frequency coordination.

18. We believe that these objectives apply equally to commercial and public safety applications of the spectrum.

19. Harmonization with the U.S. will enable public safety users to benefit from economies of scale in equipment manufacture associated with a homogeneous North American market. It will also enable interoperability of user devices between Canada and the US, which is of critical importance in emergency events requiring mutual aid between agencies on both sides of the border.

20. A unique Canadian band plan is fundamentally undesirable as it makes these objectives difficult, if not impossible, to achieve.

21. While we agree with the Department that Option 3 “maximizes the available contiguous spectrum in the 700 MHz band” we do not support adoption of Option 3 (APT band plan). If this band plan were adopted, Canadian public safety users would face extended timelines availability of equipment designed for this band plan. More importantly, this band plan:

- Requires relocation of existing 700 MHz narrowband public safety users;
- Would introduce significant cross-border interference issues, and;
- Would make cross-border interoperability impossible.

5-2. The band plans presented in the options above include guardbands. Should the Department auction the guardbands, or should these frequencies be held in reserve for future use such that they are technically compatible with services in the adjacent bands?

22. The Yukon advocates maintaining the existing SRSP-511 guardbands associated with public safety narrowband spectrum in the 700 MHz band.

23. The Department should not auction guardbands at this time. Rather, guardbands should be held in reserve until technical requirements for mutual protection of public safety narrowband and broadband systems and commercial broadband systems are better understood. This will only occur once deployment plans for these types of systems in the

700 MHz band are further developed (i.e. type of RF access technology, system architecture, etc.). In addition, further developments in the US related to band plans and guardbands will need to be considered.

Also comment on any related aspects not addressed above or other possible options, including combinations of options.

5-3. Do public safety agencies need spectrum for broadband applications?

24. We believe that public safety requires a dedicated allocation of spectrum in the 700 MHz band to support broadband applications.

25. The Yukon Government has consulted with public safety and public service stakeholders in Yukon. Our consultation with these stakeholders has clearly indicated that:

- Demand from public safety and public service agencies for wireless broadband services and the mission critical applications they support will experience growth rates similar to those observed in the broader marketplace (i.e. demand from consumer and business users);
- Commercial wireless broadband services cannot be relied upon by public safety agencies in times of crisis because of the degradation those services experience as a result of excessive demand from commercial users.

26. The Yukon agrees with the Department's view that communication among public safety agencies is imperative during major events or a disaster. We also support the view that technical interoperability among public safety agencies is of critical importance and can best be achieved with the availability of common, harmonized spectrum allocations across Canada.

28. The Yukon, therefore, urges Industry Canada to assign dedicated 700 MHz spectrum for the purpose of building a national, interoperable wireless broadband network for the use of public safety and public sector organizations – those having a mission and mandate to provide critical services for the protection of life and property.

29. We envisage that such a national network will involve a number of non-overlapping, geographically distinct but technically compatible broadband wireless systems – a “system-of-systems”. This will involve a mix of permanent systems in developed areas and temporary (tactical) systems, deployed in response to emergency events in locations without permanent systems.

If so:

(a) How much and for which type of applications?

30. The Yukon believes that the public safety community requires allocation of 20 MHz (10 + 10) of broadband spectrum in the 700 MHz band to support current and future wireless broadband applications. A discussion of the basis for this bandwidth demand is provided below.

31. The primary driver for wireless broadband capacity for public safety is the need for multimedia content delivery to and from emergency field personnel with centralized management of this content, i.e. video, imaging, mapping. The availability of compact, integrated devices capable of managing multimedia content is a key requirement and public safety needs to leverage technology developments in the commercial marketplace to fulfill this requirement. This will require adoption of standardized technologies (e.g. 3GPP Long Term Evolution) developed for the commercial marketplace and spectrum allocations suitable for deployment of those technologies.

32. A wide range of broadband applications are envisaged for deployment by public safety,

including:

- Computer Aided Dispatch (CAD) systems access
- Automatic Vehicle Location (AVL) and tracking
- Emergency responder personnel tracking
- Streaming of live video feeds to and from the field for a variety of purposes
 - Tactical surveillance
 - Incident recording
 - Distribution of Next-Generation 911 video information from the public to first responders and other field personnel
- Field access to GIS/mapping systems with dynamic, tagged information for enhanced situational awareness
 - Weather
 - Road closures
 - Power outage
 - Earthquake feeds
 - Emergency alert (hazard) information
 - Incident information
 - Health hazard and disease outbreak case information
 - Infrastructure mapping (power, pipelines, etc.)
- Electronic incident command systems and “Common Operating Picture” applications
- Access to on-line databases of multimedia content:
 - Records (RMS) and case management systems access (Fire, Police, etc.)
 - Building plans, HAZMAT/CBRNE and other hazard inventories
 - Resource inventory databases
 - Still image database access (e.g. facial recognition)
 - CPIC access
 - Biometric analysis
 - Insurance record and registry databases (vehicles, vessels, aircraft)
- Telemedicine applications within emergency medical services:
 - Vital signs telemetry
 - Patient records access
 - Future video/audio feeds for remote emergency mobile consultation/assessment
 - Future high resolution mobile imaging and diagnostic applications
 - Possible future mobile robotic applications and procedures and similar
- Human tracking systems:
 - Evacuee tracking
 - Mobile patient/client telemetry monitoring and alerting systems
 - Corrections mobile monitoring and alerting systems
- Access to enterprise networks
 - Email and office automation systems
 - Unified messaging and communications (e.g. VoIP telephony)
 - Intranet and Internet access
 - Enterprise applications (personnel systems, etc.)
- Vehicle telemetry and control
- User device software updates and maintenance/downloads
- License plate recognition
- E-ticketing
- Robot control
- Sensor and machine-to-machine communications (fixed and portable)

33. These applications apply to and will be used by a wide variety of emergency response organizations and users at all levels of government, in addition to first responder (Police, Fire, EMS) agencies:

- Natural resource operations (wildfire management, environmental response, conservation officers)
- Emergency Management organizations
- Corrections and Sheriff's Services
- Coroners Service
- Transportation agencies, including Commercial Vehicle Inspection
- Search and rescue – Air, Ground, Marine, HUSAR, including Northern areas
- Border enforcement
- Utilities (electrical, gas, water, sewer) and Public Works
- Health services providers in addition to EMS agencies (Hospitals, Clinics, etc.)

34. For this reason, we believe that spectrum dedicated to public safety and the networks built using that spectrum must be available to a wide variety of agencies providing public safety services and other types of public services involving protection of life and property. While we recognize that the Department is not seeking comments on the definition of "Public Safety" at this time, we believe this should be the subject of future consultation.

Broadband Capacity Demand Estimation

35. In response to a request for technical advice by Public Safety Canada and on behalf of the national public safety community, the Centre for Security Science within Defence Research and Development Canada, with technical oversight by the Communications Research Centre, conducted a scientific assessment of the 700 MHz spectrum requirements for broadband mobile data communications. The results of this assessment are contained in the document "700 MHz Spectrum Requirements for Canadian Public Safety Interoperable Mobile Broadband Data Communications", commissioned by Defence Research and Development Canada, Centre for Security Sciences. This document has been submitted to the Department by Public Safety Canada in its response to this consultation.

36. As discussed above, new technologies and applications are at hand that can enhance situational awareness and improve coordination between public safety personnel. The mobile broadband network must have sufficient throughput to support the many applications required by public safety personnel now and in the future. Bandwidth requirements will vary depending on the operations being conducted, whether day-to-day routine calls, crowd control, or major emergency situations. Since the network must be designed to provide connectivity that responders can rely on at all time, the bandwidth requirements must be addressed in the context of how responders intend to use the mobile broadband network during emergencies.

37. In order to assess the requirement with appropriate context and relevance, stakeholders were consulted across the nation, facilitated through linkages provided by the Canadian Interoperability Technology Interest Group (CITIG). Three incident scenarios were selected as case studies for public safety stakeholders to develop the incident response profiles. The profiles consisted of establishing how many resources and assets would be assigned to each incident and what applications would they make use of during each incident. The incidents that were chosen as case studies represent major but commonly re-occurring events (such as a sports event). We know that catastrophic events of the scale of a major earthquake or a concerted terrorist attack (9/11) would create demands that would far exceed any available spectrum and so such situations were not considered in the analysis.

38. The data throughput for each application was derived from empirical studies conducted by public safety agencies, support organizations, and research labs. Thus, the Data Demand Model (DDM) is derived from the incident-response profiles and the applications throughput requirements, in addition to growth assumptions over a 20-year horizon. Particular attention was paid to tactical video as it is expected to prevail in enhancing situational awareness and is often critical, particularly to security operations. It is also the largest consumer of bandwidth. As such, various techniques are considered in the DDM to reduce the preserve bandwidth requirement in the presence of video traffic.

39. Because of the large push by the commercial carriers to deploy Long Term Evolution (LTE) technology within 4th generation mobile broadband networks and since the United States has selected LTE as the technology for public safety mobile broadband, using the same technology in Canada will leverage the economies of scale and enhance interoperability between Canadian and US public safety agencies. LTE was therefore selected as the basis to develop the capacity model for this report. There are substantial research efforts underway to enhance the capacity of LTE and so the capacity model introduces a factor to account for a number of anticipated enhancements in spectral efficiency at various intervals over the 20-year horizon of the model.

40. The required bandwidth is revealed by correlating the data demand with the capacity. Several fundamental assumptions are used in the models such as the rate at which research into spectral efficiency is transformed into reality and the number of users accessing the same applications simultaneously. The effect of varying these assumptions on required bandwidth is examined, as is the effect of uncertainty in predictions, which increases with time particularly as we look into the future 15-20 years.

41. The result of the modeling, taking into account uncertainty factors, shows that the amount of bandwidth required to satisfy the needs of public safety to conduct their missions during commonly re-occurring major emergency situations with modern tools and applications is greater than 20MHz in the near-to-mid term, and likely to also exceed 20MHz in the long term, despite advances in technology. Clearly, even with the full 10 + 10 MHz allocated, the community will need to take measures to efficiently manage broadband data communications carefully during periods of peak demand.

42. We would also like to point out that these results are consistent with the analysis presented by Motorola to the FCC Office of Engineering and Technology, the Public Safety and Homeland Security Bureau and the Wireless Telecommunications Bureau on April 9, 2010. This presentation was filed as public record in Ex Parte by Motorola on April 12, 2010 on WT Docket 06-150 and PS Docket 06-229.

(b) What are the anticipated deployment plans and the possible constraints, if any, in implementing these plans?

43. Some of the applications mentioned in 5-3 (a) above are currently deployed and in regular daily use in support of emergency first responder operations, for example CAD, RMS and AVL. Current services are primarily delivered by existing private (narrowband) data or commercial wireless data networks.

44. However, existing private and commercial data networks have significant limitations in terms of performance, coverage, capacity, security and resilience that preclude effective deployment and use of many of the applications described above.

45. Although there is a large list of potential applications that could utilize a public safety wireless broadband network, deployment of advanced services is also constrained by public safety's ability to address issues related to funding, resources, security, business process transformation and user training. For this reason, deployment plans for many advanced services are not well developed at this time.

46. It is our view that demand from public safety and public service agencies for wireless broadband services and the mission critical applications they support will experience growth rates similar to those observed for consumer and business users. Deployment plans for will therefore be dependent on the availability of suitable and cost effective broadband wireless networks on which these applications will ride.

(c) Is there suitable alternate spectrum to the 700 MHz to meet these broadband requirements?

47. The Yukon believes that there is no other suitable spectrum that could be licensed to public safety to meet the wide-area mobile broadband requirements of public safety.

48. The 700 MHz band possesses several advantageous characteristics that make it very desirable for implementing public safety broadband applications, in comparison to other frequency bands. This includes:

- An optimal balance between in-building penetration and longer distance coverage;
- Sufficient channel bandwidth required to provide the necessary capacity for broadband services;
- Availability nationwide and potential for harmonization with the U.S., fulfilling public safety requirements for national and international interoperability.

49. By definition, broadband communications require a broad channel. There is insufficient contiguous, unallocated spectrum in any other band in the 1 kHz to 1 GHz range that can provide sufficient capacity and coverage required for mobile broadband communications. Other spectrum currently allocated to public safety is assigned in 12.5 or 25 KHz channel widths and only suitable for narrowband (i.e. voice) services due to this fragmentation and the method of licensing

50. The only alternative broadband spectrum that is currently available to public safety is in the 4.9 GHz band and this spectrum is only suitable for local-area communications (i.e. hot-spots within an incident scene) due to its limited propagation range. Because 4.9 GHz public safety licenses are not exclusive, in practise it is difficult to ensure long-term sustainability of performance for a permanently deployed system in this band due to co-channel interference.

51. As discussed above, public safety needs a contiguous block of spectrum equivalent to 2 x 10 MHz to enable efficient deployment of broadband wireless services supporting wide area mobility. This can only be achieved in the 700 MHz band.

5-4. Comments are sought on the need for public safety broadband radio systems to be interoperable:

(a) between various Canadian public safety agencies;

52. Interoperability between and among Canadian public safety agencies is a fundamental requirement of a national public safety broadband network.

53. National interoperability would enable mobility of emergency responders across the country and enable personnel working in another jurisdiction to have access to the tools and systems they

would normally utilize in their home jurisdiction.

54. This can only be achieved by building and operating all systems across the country according to common technical and operational standards, using common radio spectrum with an effective governance structure. As discussed in 5-3 above, a technically compatible “system-of-systems” is envisaged, consisting of a mix of permanent and temporary, event based systems.

(b) Between Canadian and U.S. public safety agencies.

55. Interoperability across the Canada-US border is a fundamental requirement for a public safety wireless broadband and will require establishment a bi-lateral governance structure to oversee cross-border technical and operational matters. The Province believes that the CANUS Interoperability Working Group identified in the Communications Interoperability Strategy for Canada can form the basis of such a governance structure.

56. It is imperative that the Canadian 700 MHz public safety broadband spectrum allocation align with the US band plan identified in Figure 5.7 of the consultation paper, which makes provision for the potential allocation of the D Block to public safety. This will ensure that broadband user devices will function on any public safety network in either country. This not only provides the required cross border interoperability functionality, but creates a much larger market for specialized public safety devices creating scale and lower costs. The FCC in the US has recently mandated the use of LTE technology for 700 MHz public safety wireless broadband systems, setting a precedent applicable to both countries.

5-5.What are the challenges faced today by public safety agencies to have cross-border radio interoperability in other frequency bands?

Supporting rationale for your responses to the above questions should be provided.

57. As discussed in our response to question 4-2 above, it is our view that current spectrum holdings by public safety agencies in Yukon are not suitable for deployment of mission-critical wireless broadband services so assignment of new spectrum to public safety in B.C. will be needed.

58. As there is no spectrum currently allocated that can support wide-area broadband services, we will focus our comments on issues related to cross-border radio interoperability for narrowband (primarily voice) services.

59. The primary challenges related to cross-border interoperability are:

- Fragmentation of the radio spectrum, resulting in different agencies using different bands with incompatible equipment.
- Un-harmonized band plans and spectrum utilization rules on either side of the border (historically in VHF and UHF bands, more recently in 800 MHz due to rebanding in the US)
- Lack of harmonized interoperability channels for cross-border use
- Spectrum congestion, particularly along the border
- Different licensing and coordination rules for different bands and between Canada and the U.S in the same band
- Inability for Canadian users to access channels and infrastructure licensed in the U.S. and vice-versa

60. These challenges were widely debated and discussed during the Canada-U.S. Cross Border

Interoperable Communications Workshop held in September 2010 in Windsor, ON.

61. In addition, cross border interoperability for both voice and data can be challenging due to increased security considerations. This applies to both encrypted voice (for cross border investigative work) and data. In such cases, it is desirable to have a two way control mechanism that allows the sharing of voice and / or data only when needed and authorized. This ensures that both the Canadian and U.S. agencies have authorized the interoperability on a case by case basis (for a specific operation) so that no unauthorized information is shared with the other country. For broadband data (and encrypted voice) sharing, encryption can be used to protect the data over the air and the sharing application residing on the network can provide the firewall and interoperability control mechanisms.

5-6. Notwithstanding your responses to questions 5-3 to 5-5, the Department seeks comments on whether public safety broadband needs can be met by using commercial systems with priority access rights for public safety, at commercial rates.

(a) Your views and comments are invited on priority access rights, including pre-emption, and on the feasibility of such a system.

62. In times of emergency, bandwidth on wireless broadband networks is a critical and finite resource. The radio spectrum is the fundamental resource required to enable bandwidth/capacity available on wireless networks. Public safety needs to directly control this critical resource and cannot be dependent on commercial carriers to make resource allocation decisions on behalf of public safety, particularly in times of crisis.

63. Public safety's experience with use of commercial wireless systems for mission critical operations has shown that:

- Commercial operators are unwilling to enter into prioritized-service agreements with public safety agencies;
- Commercial networks get significantly congested during significant emergency events;
- Outages of commercial networks do occur and restoration time can be long;
- Effective technical mechanisms for prioritization and pre-emption on broadband wireless networks do not currently exist;
- Coverage and capacity requirements for commercial networks and users are not necessarily the same as for public safety users;
- Previous attempts at implementing prioritization mechanisms on commercial networks have either failed (e.g. PAD) or had limited success (e.g. WPS).

64. The failed D block auction in the U.S. in 2008 illustrates that commercial operators do not fundamentally believe that there is alignment between the needs of public safety and the needs of the mass market such that both types of users can share common spectrum and common network infrastructure.

65. These issues arise because commercial network operators are primarily motivated by maximizing usage, revenue generation and hence, profitability, on their networks. To do this they must address the needs of the majority of users (i.e. consumers and business users) in their network designs and operational policies. This is reinforced by the necessity to secure sufficient revenue to cover not just the life cycle cost of the network infrastructure, but also the amortized cost of the commercial spectrum the network is built upon.

66. Dedicating spectrum to public safety will remove pressure for that spectrum to generate

commercial profit offset spectrum costs derived through auction. It will also provide a clear signal to industry of Canada and the United States' commitment to public safety broadband in 700 MHz that will lead to investment in hardware, applications and supporting systems to leverage commercial value of the spectrum in a different manner.

(b) What public safety technical and operational requirements cannot be met by commercial systems, from either a public safety or commercial operator point of view?

67. The fundamental public safety operational requirement that cannot be met by commercial systems is the availability of bandwidth to support mission-critical communications during significant emergency events. It has been observed many times that the highest level of capacity demand by the general public on commercial wireless networks occurs in the vicinity of emergency incidents, at the same time and location as capacity demand by public safety is at its highest.

68. We believe that priority access or pre-emption will be extremely difficult to implement successfully, particularly when high priority public safety traffic is mixed with a high volume of low-priority or best effort traffic from the general public. As an example, we would not endorse pre-emption of 911 calls from the general public under any circumstances and would argue that as more voice telephony traffic gets carried as Voice-over-IP, it will be very difficult to differentiate this type of traffic from other types of data.

69. Although we cannot comment on the technical effectiveness of current or future priority access mechanisms supported by wireless broadband standards such as LTE, we do believe that to be effective, any resource prioritization or priority access policy must address the application level and be based on the relative priority of different applications across the user population. It is not sufficient for priority to be applied solely at the device level given the expected, multi-purpose nature of mobile broadband user devices.

70. We believe prioritization can only be effective when public safety agencies determine among themselves, via an appropriate governance process and in the absence of commercial influence, basic policies for traffic prioritization that can be applied to dedicated public safety spectrum.

(c) What specific rules, if any, should be mandated by the Department to make such a system viable?

71. The Yukon does not believe that the Department can effectively apply rules to commercial spectrum that would resolve these issues.

5-7. Comments are sought on the need for regional (local, provincial, etc.) dedicated broadband networks to provide access to all public safety agencies, and the institutional feasibility of implementing such a system.

72. The Yukon believes that a nation-wide public safety broadband network should be built out across the country as a "system-of-systems", with networks being built with differing geographical scope depending on the needs of those jurisdictions.

73. For example, some provinces and territories may elect to build out province/territory-wide systems covering all urban and rural areas, while in other provinces and territories a mix of regional/urban systems and provincially/territorial-controlled rural systems may emerge.

74. In all cases, there should only be a single network in any given geographic area, with all systems across the country being built to the same technical standards to ensure interoperability.

These networks need to be built using spectrum dedicated to public safety so that public safety can control resource allocation and the technical and operational specifications of the network.

75. The network deployment model will be dependent on establishment of an effective governance structure for the use of public safety broadband spectrum and the resulting “system-of-systems”. This governance model will have components at the Federal, Provincial, Territorial and Regional/Local¹ levels, with the Federal / Provincial / Territorial aspects being aligned with the governance model identified in the Communications Interoperability Strategy for Canada (CISC). Within this structure, governance at the F/P/T level would be vested with SOREM¹ and would have decision-making authority related to technical and operational matters needed to ensure national interoperability.

76. It is envisaged that in the majority of cases, public safety broadband networks would be built either at the Provincial, territorial or Regional level, with such systems linking into the F/P/T governance structure at the national level. Financial oversight would need to be vested with those organizations or bodies actually building and operating individual (Provincial Territorial or Regional) systems.

77. It could also be envisaged that these networks could primarily be built following a Public-Private- Partnership model, where private industry would have a significant role to play in the construction and operation of the backbone networks and provision of public safety-specific applications, while public bodies would be responsible for funding, operational policy and user support.

78. To make these systems financially viable, the user base needs to be as broad as possible, addressing all first responder agencies at the local, provincial and federal level, in addition to all agencies having a mandate for operations in support of emergency response and life safety missions (see list of agency types in the response 4-2 to above). In many cases, financial viability will be directly determined by the ability of the wireless broadband network to support agency cost savings through leveraging of new technologies dependent on wireless broadband connectivity (e.g. multi-media streaming – voice, video, data/telemetry and imagery).

79. The Yukon believes that licensing of dedicated broadband spectrum at no cost to public safety agencies will provide significant financial advantage in favour of the construction and ongoing operation of dedicated public safety wireless broadband networks and will accelerate user adoption and application deployment.

80. Specifics of business model and financial viability for such a system has not been studied or defined in detail to date. Much work remains to be done, although we believe that some of the key governance enablers related to “institutional feasibility” already exist.

81. Some elements of a viable business and financial model would include:

- Use of existing public infrastructure (radio towers, sites, network facilities, etc.)
- Financial contributions from all levels of government and private industry
- Long term user contracts supporting stable rates of return on private investment
- User fees

5-8. Is there a need for a dedicated national interoperable broadband network to provide access to all public safety agencies? The Department seeks comments on the institutional feasibility of implementing such a system. Provide supporting arguments for your responses to the above questions.

83. See response to 5-7 above. We do not envisage that a single national network would be built. Rather a national “system-of-systems” would be implemented, where there would be a single network in any given geographic area, with all networks across the country being built to the same technical and operational standards to ensure interoperability.

5-9. If band plan Option 1, 2a, or 2b in Section 5.1 is chosen, which one of the three options described above should be adopted and why is this option preferred over the other options? Provide supporting rationale.

84. The Yukon believes that Option 3 (10 + 10 MHz designated for public safety) should be adopted. The supporting rationale is as follows:

- Public safety will require 20 MHz of dedicated spectrum in order to ensure availability of sufficient bandwidth to support significant emergency events;
- We do not believe that spectrum can be effectively shared between public safety and commercial users as discussed in 5-6 above; and
- This option provides for harmonization with the current U.S. direction, as announced by the White House recently.

85. Please refer our response to question 5-3 (a) above for more background on the quantity of spectrum needed by public safety.

5-10. If commercial operators are mandated to support public safety services, what tier size should be applied in order to ensure adequate public safety coverage?

86. We do not advocate mandating commercial operators to support public safety services. Rather, dedicated spectrum should be allocated to public safety services. Commercial operators will be under significant economic pressure to find ways to utilize their spectrum holdings for commercial benefit, resulting in communications difficulties in emergencies. Rather, dedicated spectrum should be allocated to public safety.

5-11. If the APT band plan (See Option 3 in Section 5.1) is adopted:

(a) Given that the APT band plan requires a 55 MHz duplexing separation, can Canadian public safety services operate their current narrowband systems in this band plan configuration? If not, what are possible alternatives to address public safety needs?

87. Please refer to our response to question 5-1 above, including a response to the question related to narrowband systems.

88. The Yukon is recommending that band plan Option 1 in Section 5.1 be adopted.

(b) Should spectrum be designated for dedicated public safety broadband systems, and how much?

89. The Yukon is recommending that band plan Option 1 in Section 5.1 be adopted.

You are also invited to comment on any related aspects that are not addressed above, including whether the decision should be delayed until the U.S. situation is known.

90. If the U.S. situation does not get clarified prior to Industry Canada making a decision on the

700 MHz band allocation, we recommend that sufficient spectrum be set aside (i.e. not auctioned) in the 700 MHz band to allow Canada to harmonize with the US once its band plan is known.

91. We expect that will mean setting aside 2 blocks of 10 MHz, i.e. 758-768 and 788-798 MHz, which encompasses the current US public safety broadband allocation and the D block.

5-12. The Department seeks comments on whether the auction of 700 MHz commercial spectrum should be based on uniform tier sizes across all spectrum blocks, or a mixture of tier sizes.

92. To best address service demand across different geographic areas, competition and flexibility, the province recommends a mixture of tier sizes across all spectrum blocks that are auctioned.

93. Public safety spectrum should not be auctioned but assigned to an appropriate body with a mandate to oversee the effective utilization of the spectrum on behalf of public safety. In regards to Public Safety please see our response to question 5-7 for further details.

5-13. Based on your answer above, what tier size(s) should be adopted? Provide supporting arguments for your responses to the above questions.

95. Public safety spectrum should not be auctioned but assigned to an appropriate national, provincial or territorial body with a mandate to oversee the effective utilization of the spectrum on behalf of public safety. In regards to Public Safety please see our response to question 5-7 for further details.

Effective immediately, no new broadcasting certificates will be issued for LPTV stations in TV channels 52-59 (698-746 MHz).

The Department proposes that the displacement of the incumbent LPTV stations be subject to a notification period of one year for LPTV stations located in urban areas or in specific geographic areas, such as along highway corridors; and a period of two years for LPTV stations in all other areas. A displacement notification can be issued only after technical determination is made concluding that continued operation of the incumbent LPTV station would impede the deployment of new licensed systems in the 700 MHz band.

5-14. The Department seeks comments on the transition policy proposed above.

96. The Yukon supports the Department's proposal. We believe that the proposal would have no adverse impact in the Yukon.

5-15. The Department seeks comments regarding its proposal to permit low-power licensed devices, including wireless microphones, to operate in the band 698-764 MHz and 776-794 MHz only until March 31, 2012.

97. The Yukon has no comment at this time.

6-1. The Department seeks comments on its proposed changes to the *Canadian Table of Frequency Allocations* for the band 698-806 MHz.

98. The Yukon supports the Industry Canada proposed changes to the Table.

7-1. The Department seeks comments on the current state of competition and its anticipated evolution, including the impact on consumers in the Canadian wireless services market:

(a) in general;

99. Competition only exists where there is a sufficient market economic activity to justify the

infrastructure deployment and offer a profit opportunity. Commercial network operators are primarily motivated by maximizing infrastructure utilization, revenue generation, and hence, profitability, on their networks. To do this they must address the needs of the majority of users (i.e. consumers and business users) in their network designs and operational policies.

This is reinforced by the necessity to secure sufficient revenue to cover not just the life cycle cost of the network infrastructure, but also the amortized cost of the commercial spectrum the network is built upon

101. New Canadian mobile wireless providers that have deployed service have not demonstrated an interest in anything other than the largest urban areas, as they focus on market share. There is no evidence that this focus will change in the near future.

102.. Many rural and remote locations typically have a single service provider that typically only provides partial coverage of the area. This is due to the marginal business cases resulting from low customer density, and the high cost of deployment in challenging terrain. Of the larger carriers, only those that can leverage existing infrastructure are able to provide services to the rural communities. This problem will be exacerbated as the population shifts from remote and rural areas to more populated regions. This trend is shown in the last census taken by Statistics Canada.

(b) in terms of its contributions and interaction to the broader Canadian telecommunications service market;

105. The current state of competition clearly serves the needs of urban citizens and continues to evolve services to meet those needs. Unfortunately the current status quo does not encourage new service providers of any size to serve the needs of rural and remote locations.

106. Please refer to the responses in questions 8-1, 8-2 and 8-3 for further information.

(c) in comparison with the wireless markets of other jurisdictions.

107. We believe that our response in (a) and (b) are representative of the situation in other jurisdictions as well, but will leave the determination to the respective authorities in those jurisdictions.

7-2. Provide views, and any supporting evidence, on the impacts of government measures adopted in the AWS auctions, including the impacts on consumers and on the state of competition. In particular, what has been the impact, if any, of such measures on industry concentration, barriers to entry or expansion of services, and the availability of new or improved service offerings and pricing plans?

108. There has been much speculation by industry observers that the past spectrum auction drove up costs inappropriately due to the structure of the process. The speculation specifically pointed to the use of restricted spectrum for some participants, which appears to have resulted in disingenuous speculative bidding based on game theory, rather than serious bidding based on business requirements and needs.

109. Clearly activity of this sort, that drives up costs unnecessarily, hurts the consumer, who in the end bears the burden of business costs (whether just or unjust) through the rates they pay. This could be one reason the cost of mobile wireless service in Canada is significantly higher than in other jurisdictions such the United States.

110. The Yukon strongly urges Industry Canada to review the past auction process and if necessary, take appropriate action in the 700 MHz allocation process to insure that such distortions do not impact this or other commercial auctions.

7-3. In light of the current conditions in the Canadian wireless service market(s), is there a need for specific measures in the 700 MHz and/or 2500 MHz auction to increase or sustain competition?

111. The pricing of spectrum needs to be linked with the geographic market place value to provide opportunity for rural and remote areas.

112. The Yukon strongly urges the creation of modestly priced licensed spectrum that covers modestly sized geographic areas (that exclude urban and metropolitan areas). This licensed spectrum frequency block should be large enough to support the anticipated current spectrum needs as well as a reasonable growth factor for the future.

113. This frequency block should not be available for allocation to current mobile providers (whether incumbent or “new”), anticipated multi-jurisdictional participants who are expected to enter the mobile markets in the near future, or speculative spectrum investors who have no inclination or timely plan to use the spectrum for services to citizens.

114. In addition this modestly priced licensed spectrum should have a “use it, or lose it” clause that is reasonable in nature, to preclude speculative hoarding of the spectrum resource. A reasonable term or timeline for demonstrable usage could be as short as 3 years.

117. As previously commented, there is often only a single provider.

7-4. The Government of Canada has undertaken a consultation on potential changes to the foreign investment restrictions that apply to the telecommunications sector. How would the adoption of any of these proposed changes impact your responses to the questions above? Provide supporting evidence and rationale for all responses.

118. The Yukon has no comment at this time.

7-5. If the Department determines that there is a need for measures to promote competition, which of the above mechanisms would be most appropriate and why should this mechanism be considered over the other? Comments should also indicate if further restrictions should apply so that policy objectives are met, for example, over a given time period?

119.. Please see above comments on geographical spectrum blocks in rural and remote locations.

120. The Yukon believes that it is a proven case that broad competition in these rural and remote markets will not happen in a reasonable foreseeable timeframe.

121. For this reason the real focus should be to create an environment where highly motivated, experienced small market service providers can build a sustainable business case. In many situations the business case may only be able to be constructed as an expansion or enhancement of an existing network.

129 This allocation of spectrum (700 MHz) is an opportunity which will not likely present itself again for decades. This is spectrum that has optimal characteristics for rural and remote area use, and the exercise of reallocation is extremely uncommon. The Yukon urges Industry Canada to consider this opportunity.

130 Please see questions 5-12 and 5-13 for further possible measures.

In light of your response above, and recognizing that pending decisions on the specific band plan, spectrum for public safety system, tier sizes and open access requirements could influence your response:

7-6. (a) If the Department were to implement spectrum aggregation limits (caps):

(i) Should the cap apply to the 700 MHz band only or be broader?

131 The Yukon has no comment at this time.

(ii) What should the size of the cap be?

132 The Yukon has no comment at this time.

(iii) Should bidders and their affiliates or associates share the cap?

133 The Yukon has no comment at this time.

(iv) How long should the cap remain in effect?

134 The Yukon has no comment at this time.

(b) If the Department were to implement a set-aside in the 700 MHz auction:

(i) Who should be entitled to bid in the set-aside block(s) and should the entitled bidders be restricted to bidding on the set-aside only?

135 Please see question 5-12 and 7-3.

(ii) How much spectrum should be set-aside and which block(s) should be set-aside?

136 Please see question 5-12 and 7-3.

(iii) If the set-aside were to include multiple blocks of spectrum, should they be contiguous?

137 The Yukon has no comment at this time.

(iv) What restrictions should be put in place to ensure that policy objectives are met (for example, should trading of the set-aside spectrum be restricted for a given time period)?

138 The Yukon has no comment at this time.

7-7. Are there other mechanisms that should be considered and, if so, how should these be applied?

139 The Yukon has no comment at this time.

7-8. The Government of Canada has undertaken a consultation on potential changes to the foreign investment restrictions that apply to the telecommunications sector. How would the adoption of any of the proposed changes affect your responses to the questions above? Provide supporting evidence and rationale for all responses.

Note: The possible implementation of a set-aside regarding the 2500 MHz spectrum to be auctioned will be dealt with in a separate consultation.

141 The Yukon has no comment at this time.

8-1. In the above context, the Department seeks comments on challenges and specific problems affecting the deployment of broadband mobile services to low-density rural and remote areas.

142 The Yukon has no comment at this time.

8-2. Is there a need for further regulatory measures or changes to existing regulatory rules (e.g. RP-19) to facilitate service deployments in rural and remote areas that remain unserved and/or underserved?

149 Some of the existing alternatives to accessing spectrum may not be optimum. The option of entities forming a consortium that would bid on spectrum would need a well defined governance structure and business arrangement between participants.

150 Consortium participation in an auction process may be possible, however individual members would most likely still be accountable for the purchase of the spectrum. Since this option most likely envisions using existing geographic tiers for spectrum allocation, not all the purchased spectrum may be usable by the consortium members. This could lead to poor utilization of the spectrum. It may also lead to the cost of the usable spectrum being higher when compared to the cost of smaller geographic spectrum areas being recommend in this submission.

151 Frequency transfer is another possible option, however due to the value the carriers place on the 700 MHz band for its rural and remote characteristics and added capacity in urban areas, this is very unlikely to occur. It is also unlikely there will ever be a transfer of frequency between large carriers as the economic criteria for both parties in rural and remote areas are similar. Lastly, it is unlikely there will ever be a transfer of frequency between a large carrier and a small ISP as it's very difficult to facilitate a commercial arrangement such as this, between large and small entities.

152 Generally, policies such as RP-019 do not appear to provide a resolution to the issues in regards to small to medium ISP's and service expansion to rural and remote areas.

Specifically, RP-019 appears to focus on cellular services and new entrant into the market.

As mentioned previously, new cellular service providers are focusing their deployment into high density urban areas. It is unlikely a new entrant could build a business case in an area that the large carriers are unable to.

153 Policies such as RP-019 should be updated to address the requirements of advanced adband services, small to medium ISP's and rural and remote areas.

154 Please reference responses to questions: 5.12, 5.13, 7.1, and 7.3 for further information.

8-3. Should the Department decide that measures are necessary, comments are sought on specific measures that could be adopted within the 700 MHz spectrum auction process to ensure further deployment of advanced mobile services in rural and remote areas (e.g. roll-out conditions, tier structure, etc.).

Rationale and supporting evidence that substantiate your responses should be provided.

155 Please reference responses to questions: 5.12, 5.13, 7.1, and 7.3.

9-1 The Department seeks comments on whether there is a need for government intervention to promote open access, by increasing access by users to handsets and/or applications.

156 The Yukon has no comment at this time.

9-2. If government intervention is needed, which of the following options should be implemented?

Option 1: Mandated open access requirements across all future commercial mobile bands

Option 2: Mandated open access requirements for the entire commercial mobile spectrum in the 700 MHz band.

Option 3: Mandated open access requirements for the "C Block" (746-757/776-787 MHz) as in the United States.

Please provide supporting arguments for your responses, and any additional comments related to provisions of open platforms for devices and applications.

157 The Yukon has no comment at this time.

10-1. The Department is considering three options to proceed with the 700 MHz and 2500

MHz bands auction processes:

Option 1: to conduct an auction for licences in the 700 MHz band first, followed by an auction for licences in the 2500 MHz band approximately one year later;

Option 2: to conduct an auction for licences in the 2500 MHz band first, followed by an auction for licences in the 700 MHz band approximately one year later;

Option 3: to conduct one combined auction for licences in both the 700 MHz and 2500 MHz bands, which would be six months later than the first auction in the case of separate auctions.

Industry Canada is seeking views on the merits or disadvantages of proceeding with each of the various options stated above. The Department seeks to understand the magnitude of interdependencies between the two bands from a business/operational perspective.

Specifically, comments are sought as to the extent spectrum in these bands is interchangeable or complementary from both a technological and a strategic perspective. In addition, views on the business and financial capabilities of participating in a joint auction for both bands are sought. Comments should include the rationale for selecting one option rather than another.

158 The Yukon has no comment at this time.