

Response to SMSE-018-10 “Consultation on a Policy and Technical Framework for the 700 MHz Band and Aspects Related to Commercial Mobile Spectrum”



TRI-SERVICES JOINT INTEROPERABILITY COMMITTEE (TSJIC)

Response to Canada Gazette No. SMSE-018-10: “Consultation on a Policy and Technical Framework for the 700 MHz Band and Aspects Related to Commercial Mobile Spectrum”

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Executive Summary

Radio spectrum is an extremely valuable public National resource with robust application potential. Despite the obvious face value of this commodity and the potential short-term revenue, the prospective societal benefits achievable through enhanced first responder capabilities far exceeds those measurable by fiscal dollars alone. The benefits we speak of are saved human lives, enhanced security, and the protection of private and public property. As with any other public National resource, when allocated for use or auctioned off for commercial purposes, it remains excluded from public safety use forever. In order to preserve this essential public safety resource and make certain that Canadian police, fire, medical and other emergency professionals have access to modern and reliable communications capabilities, the Ontario Association of Chiefs of Police (OACP), the Ontario Association of Fire Chiefs (O AFC) and the Association of Municipal Emergency Medical Services of Ontario (AMEMSO) have partnered together to form the Tri-Services Committee to present a unified voice to Industry Canada, on the critical importance of allocating a 10+10 MHz block of 700 MHz broadband spectrum for Public Safety purposes.

In order for police, fire, medical and other emergency responders to effectively protect and save lives, they must have access to modern and reliable communication systems. Current system requirements demand the ability to be interoperable across organizations and jurisdictions, not only during emergency situations, but also during day to day operations. Having the correct information at the appropriate moment in time, contributes directly to saved lives and the efficient utilization of first responder resources. Access to vital communication resources are governed both by the availability and reliability of radio spectrum. To this effect, communication capacity is a function of the amount of radio spectrum available, and is limited by the operational constraints of the radio spectrum itself.

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In this endeavour, the 700 MHz broadband spectrum is the key enabler that will facilitate the evolution of police, fire and EMS frontline response, and the crucial tool necessary to ensure that communications capacity exists to meet the increases in first responder communication data requirements.

One needs only refer to the 2006 Statistics Canada Census data on frontline responders, to understand the scope and complexity of the first responder bandwidth requirements. Distributed across Canada’s 9,984,670 square kilometres of complex and varied geography, are 69,299 police officers, 27,275 fire fighters, and 21,085 ambulance attendants and paramedical professionals. Within Ontario alone, the numbers are staggering, with 26,361 police officers, 11,595 firefighters, and 6,585 ambulance attendants and paramedical professionals spread over 1 million square kilometres. Despite many years of concerted efforts from the varied frontline responders to develop local and external interoperable communication systems, many inadequacies remain, and systems are fragmented at best. Each organization has been challenged by overwhelming costs and logistical constraints associated with providing capacity, for a vast number of first responders across the enormous and challenging Canadian geography. The allocation of the 700MHz spectrum represents a once in a lifetime opportunity to remedy the disparate first responder communications systems, and improve first responder safety. Securing a 10+10 MHz block of the 700 MHz broadband spectrum, will provide public safety responders with the crucial electronic infrastructure necessary to meet current and future mission critical data needs.

Echoing the concerns of the Tri-Services (Police, Fire and EMS), Industry Canada has itself recognized the inherent difficulties associated with the current public safety spectrum. In the Industry Canada document numbered SMSE-018-10, Industry Canada makes note that the use of 800 MHz

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public safety spectrum has doubled since its inception, with little space remaining for metropolitan applications. Similarly, with reference to the 4.9 GHz public safety band, Industry Canada emphasized that due to high infrastructure costs, short propagation distances, low penetration characteristics, and scarcity of available equipment, this spectrum has been seen scant deployment and is unsuitable for wide area augmentation. In terms of spectrum available to public service agencies, the 700 MHz broadband spectrum is characterized by a number of key advantages, namely: lower costs, as signals travel farther, requiring fewer towers and infrastructure builds; greater penetration of obstacles, buildings and foliage regardless of environmental conditions; less dependence upon line-of sight transmission; and perhaps most importantly, interference free communications. These combined advantages will allow public safety agencies to deploy more powerful wireless systems in areas that are hard to reach, and at considerable cost savings. Equally important, this spectrum is compatible with a fourth generation wireless technology called Long Term Evolution (LTE). This technology will be deployed worldwide and is supported on the 700MHz band. Through leveraging the development of these commercial broadband LTE networks, public safety will gain access to lower cost infrastructure and user devices, and will reap the benefits of economies of scale through shared partnership purchases.

The Tri-Services (Police, Fire and EMS) firmly believe that the utilization of a 4G LTE wireless network National standard, in concert with the public safety repurposing of the 700 MHz broadband spectrum, presents an exceptional opportunity to begin building the next generation emergency data and video communications system; and ultimately, a dedicated nationwide mobile broadband public safety network. The culmination of these efforts will produce an interoperable communication system capable of seamlessly interacting at the regional, provincial and national level. Further, if developed

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in concert with advances in the U.S., it will lead to increased cross-border interoperability, and decreased infrastructure and equipment costs from the creation of economies of scale. Moreover, broadband access will bring about the development of next generation first responder communications capabilities, such as: access to streaming video; real-time surveillance networks capable of identifying known terrorists through video analytics; broadcast CPIC records with mug shots; automated license plate recognition and biometric technologies including mobile fingerprint and iris identification; virtual blue-prints; real-time health-monitoring systems; 3-D GPS tracking capabilities; high-resolution patient video and patient records; and the ability to seamlessly broadcast urgent video and picture data.

In order to ensure that these advanced life-saving mechanisms exist, public safety agencies must have exclusive access to the 700 MHz spectrum. Public safety agencies must be assured that they are afforded the highest priority during emergency situations. In order to protect the public and perform their job efficiently and effectively, public safety users require guaranteed access to the communications networks they use. Total reliance upon priority and pre-emption agreements with commercial networks remains an unacceptable solution. During emergencies these networks often fail due to congestion or infrastructure breakdown, since they are not scaled nor engineered to the mission critical demands of first responders. Licensing and control of the 700 MHz spectrum is critical. Spectrum dedicated exclusively to public safety will make certain that industry build wireless broadband networks focused upon the interoperable and National Standards requirements of first responders. By design, these networks would be technologically robust, to ensure greater levels of reliability, functionality and resilience. Accordingly, the Tri-Services are advocating a public safety owned and managed wireless broadband network, to make certain the availability, reliability, and

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capacity necessary to support mission critical applications.

The Tri-Services will ensure the effective utilization of the 700 MHz spectrum by continuously working with Government to establish a national strategy to plan and build regional broadband communications systems, with a national governance structure and common technology standards. These efforts are currently under way and supported by ongoing developments from the Canadian Interoperability Technology Interest Group (CITIG), the Communications Interoperability Strategy for Canada (v 6.5), and the Communications Interoperability Action Plan for Canada (2011).

In summary the Tri-Services (Police, Fire and EMS) are advocating a multi-tiered government approach to the 700MHz broadband spectrum allocations, to ensure the needs of responders and public safety in general are considered and accounted for during the Industry Canada consultations. To fully enable this technology, first responders require a network with sufficient capacity that only a 20MHz allocation of 700MHz spectrum will provide. The allocation of 700MHz spectrum represents a once in a lifetime opportunity that ties directly to community and first responder safety, innovation, and the health of Canada’s digital economy. Future networks must be built with public safety requirements in mind, and address the crucial areas of interoperability and integrated emergency management. Spectrum allocations will have a significant impact on public safety in Canada, and directly impact the ability of first responders to protect and save lives. In every aspect of this endeavour, spectrum remains the key enabler for the creation of such a network.

Responses to SMSE-018-10:

5.1 700 MHz Band Plan Architecture for Commercial Mobile Systems

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

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

5.2.1 We understand that in the U.S. band plan, the existing guard bands between the D and C blocks were intended to provide interference isolation between the original 10+10 MHz public/private shared public safety/commercial broadband network allocation and the commercial C block. If Industry Canada allocates this identical 10+10 MHz block to public safety, the 1 MHz guard bands (757-758 MHz and 787-788 MHz) shown in Figures 5.3, 5.4 and 5.5 will continue to be required. However, if Industry Canada allocates only a 5+5 MHz block aligning with the current U.S. plan, (763-768 MHz and 793-798 MHz), a 1 MHz guard band should be placed immediately below this block (at 762-763 MHz and 792-793 MHz).

5.2.2 It must be understood that the impact of interference from adjacent channel systems is especially alarming for public safety first responders. The Tri-Services call attention to that fact that, efficient and accurate response to emergency events is predicated upon the accurate and timely transmission of information. Equally important, it is extremely difficult, if not impossible, to effectively plan incident response around areas of poor or non-existent coverage. Radio channel

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interference constitutes a serious security threat both to first responders and to the general public, whose lives and property they seek to protect. These guard bands must be held in reserve rather than auctioned.

5.2 Options for use of 758-768 MHz Paired with 788-798 MHz for Public Safety and/or Commercial Systems

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

- (a) How much and for which type of applications?
 - (b) What are the anticipated deployment plans and the possible constraints, if any, in implementing these plans?
 - (c) Is there suitable alternate spectrum to the 700 MHz to meet these broadband requirements?
- Supporting rationale for your responses to the above questions should be provided.

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

5.3.1 Allocating the 700 MHz spectrum directly for public safety use, is the only way to ensure the existence of robust, modern, and reliable public safety grade interoperable networks. First responders and public safety providers must have the right tools, in order to be able to protect and save lives. This includes interoperable communications networks that allow real-time information sharing through high speed video and data. This requires an appropriate, dedicated band of spectrum that can accommodate the everyday needs of police officers, firefighters, and emergency medical personnel; as well as provide excess capacity during times of emergency.

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5.3.2 Correspondingly, the Tri-Services request that Industry Canada allocate 20 MHz (contiguous 10+10) of 700MHz spectrum to support first responder broadband applications; not only for those envisioned today, but also to ensure capacity for future applications. In the event that the FCC does not allocate the D Block to public safety leaving only the original 5+5MHz block, the Tri-Services are convinced that a 20MHz allocation remains a necessity in Canada. Allotting 20 MHz of spectrum for public safety use will ensure that sufficient capacity exists to meet the communications needs of public safety first responders.

5.3.3 As widely reported in literature and currently indicated by Industry Canada in Canada Gazette, Notice #SMSE018E—“Industry Canada Consultations on a Policy and Technical Framework for the 700 MHz Band and Aspects Related to Commercial Mobile Spectrum”, broadband radio channels of wider bandwidth (for example, one 10+10 MHz vs. two 5+5 MHz channels) provide clear technical benefits. These sentiments are echoed by the independent analysis of broadband capacity requirements by Motorola , by Andrew Seybold , and by the Canadian Federal Government report from the Defence Research and Development Canada (DRDC) Centre for Security Science which concur that a 5+5MHz broadband allocation is insufficient to meet the requirements of public safety systems. A 10+10MHz deployment would provide capacity that is closer to the optimal establishment of mobile broadband systems by offering:

- higher per hertz spectral efficiency, enabling the provision of high capacity services in urban areas with fewer base stations;

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- extended reach, enabling the provision of target broadband speeds in rural areas while using fewer towers and improving in-building penetration in urban areas;
- reduced carbon footprint, capital, and operational costs (less equipment to manufacture and install, and reduced energy consumption); and
- reduced real estate requirements (antenna space on towers and rack space in equipment shelters).

5.3.4 Public safety organizations utilize spectrum to communicate on a day-to-day basis, in emergency situations, and for disaster relief. Land mobile systems are used by public safety agencies to provide critical communications between individuals, to large groups at the same time, and between individuals and command centres.

5.3.5 Mobile broadband applications may be used by public safety agencies to provide information such: as pictures, blueprints, real-time video feeds, biometric technologies and telemedicine, 3-D GPS in building displays, and fast record transfer, which could improve situational awareness, response times, and the overall effectiveness of first responders. Communication among public safety agencies is imperative, particularly in the event of an emergency or a disaster. As such, interoperability is a fundamental requirement for the public safety community. Dedicating common spectrum for public safety systems is a key mechanism in the development of communications interoperability.

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

5.3.6 The Ontario Association of Chiefs of Police (OACP), the Ontario Association of Fire Chiefs (OAFC) and the Association of Municipal Emergency Medical Services of Ontario (AMEMSO) have partnered together, to form the Tri-Services Committee on 700MHz Broadband Public Safety Data. The creation of the Committee is in direct response to Industry Canada’s recent announcement of public consultations on the use of the 700 MHz band by commercial mobile services.

5.3.7 The Tri-Services will provide critical leadership and momentum to the Interoperable transformation within Canada, and work with all levels of Government to ensure its timely success. Deliverables achieved through the Ontario Tri-Services Committee will compliment national efforts, and focus on interoperability development provincially, regionally and municipally in Ontario. To this end, the Tri-Services have appointed three key individuals to provide critical leadership and spearhead efforts on behalf of their respective agencies, namely: Inspector Joe Maiorano, Durham Regional Police Service for (OACP); Fire Chief Mark Diotte, Ajax Fire Department for (OAFC); and EMS Chief Doug Socha, Hastings-Quinte County Emergency Services for (AMEMSO). Collectively, the three representatives will set in motion mechanisms to monitor and advise on interoperability, inform stakeholders, and identify responder spectrum needs and potential opportunities. These activities will be complimented by

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the National-level efforts of the Tri-Services Special Purpose Committee on 700 MHz Broadband for Mission Critical Public Safety Data. The National Tri-Services Committee is comprised of key individuals from the Canadian Association of Chiefs of Police (CACP), the Canadian Association of Fire Chiefs (CAFC), and the Emergency Medical Services Chiefs of Canada (EMSCC).

5.3.8 The public safety broadband deployment will be initiated utilizing a multi-tiered, multi-jurisdictional interoperable framework. Initial work will centre on establishing the key methodologies contained within the Federal-Provincial-Territorial-Municipal (F/P/T/M) Emergency Management, Minister approved action plan titled “Communications Interoperability Action Plan for Canada”, namely:

- **Governance:** The development of supportive and responsive governance architecture at the national and bi-lateral level;
- **Standards:** The development of harmonized standardized operational procedures, information exchange models and protocols;
- **Future Communication Systems:** Promote national adoption of information exchange standards. Foster an environment of collaboration where best practices for information management and information technology (IM/IT) as well as common operation procedures and policies/regulations are exchanged, and usage promoted. Promote and support the development of national emergency communications open architecture approach and promote the adoption of open data exchange standards.

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- **Training and Exercises:** The continued evolution of multi-faceted and cross-jurisdictional education, training, exercise and evaluation programs; and
- **Usage:** The daily use of present and future communication and information system(s) including all further development and evolution.

5.3.9 The purpose of the Action Plan is to articulate the specific tasks assigned to the each action item derived from the Canadian Communications Interoperability Plan (CCIP), and strategic developments from the CCIP Working Group meetings. The action plan integrates related interoperability initiatives utilized by Public Safety in day-to-day through extremis operations; leading to enhanced emergency personnel safety, and improved efficacy. Each designated task is assigned a coordinator, with corresponding deliverable(s) and a prospective timeline.

5.3.10 The specific timelines established for each action item will be reviewed by the F/P/T/M Interoperability Working Group and approved by Senior Officials Responsible for Emergency Management (SOREM); during its cyclical review of the Action Plan. Any requirement for reprioritization will be addressed through SOREM and incorporated in the annual version of this ever-greening process. The organization or agency initially identified as the Coordinator for each action item is the primary or lead for that issue.

5.3.11 The F/P/T/M Communications Working Group will be based on the membership of the Canadian Communications Interoperability Plan Working Group until the Provinces and Territories

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appoint their own Interoperability Coordinator and representatives to the Working Group. In addition there will be representatives from federal departments and an observer from CITIG. These action items complete with tasks, deliverables and timelines, will, be prioritized annually by the PS Interoperability Working Group and subsequently approved by SOREM.

5.3.12 To summarize briefly, comprised entirely of first responders, the Tri-Services will work collectively, at all levels of government, to develop the governance model, system of systems, funding, design, and implementation strategy necessary to ensure that the 700MHz Broadband Public Safety network becomes a reality. The Tri-Services will maximize cost efficiencies and capacity, through the deployment of a broadband overlay platform, supported by existing municipal, regional and provincial radio infrastructures. Utilization of the Long-Term Evolution (LTE) standards-based platform, and a modular architecture design, will enable the development of a common, multi-jurisdictional, wide-area infrastructure, that is scalable, and which has capacity for future growth. This will enable individual organizations not involved in the initial implementation phase to add their individual systems to the common infrastructure; thus increasing total network coverage and F/P/T/M interoperability.

5.3.13 To leverage existing infrastructure and network operations expertise, the Tri-Services will analyze the feasibility of a public private partnership with existing commercial wireless operators. For the purposes of clarity, it must be understood that the establishment of the public safety broadband network is not predicated upon the direct use of a commercial carrier’s network

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for service, but rather, the public service network is a separate overlay that leverages carrier resources. Note: The Tri-Services response to the questions contained within section 5.7 will discuss this in greater detail.

5.3.14 In terms of constraints, the Tri-Services are fully cognizant that funding and competent project leadership are intimately related to the successful establishment of the 700 MHz Broadband system. Securing recurring funding at all three levels of government is a crucial requirement to this program’s success. Obtaining these necessary funds will ensure that capital exists not only for start-up expenditures, but also for the maintenance and continued operation of the system itself. Securing this level of funding will no doubt involve significant negotiation and the establishment of numerous mutual agreements. Having a centralized leadership model with clearly defined Memorandums of Understanding (MOU), will focus all involved parties to one aim, and amalgamate funding and resources. To reiterate briefly, the Tri-Services will utilize a centralized leadership structure, MOUs, and an integrated funding structure, to minimize project related risks.

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

5.3.15 The Tri-Services is of the opinion that there is no currently licensable, acceptable spectrum, capable of meeting public safety’s wide-area mobile broadband requirements. From a first

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responder public safety perspective, the 700 MHz broadband offers several beneficial characteristics that coincide with public safety broadband application needs. These benefits include: a good balance between in-building and longer distance coverage; having adequate channel bandwidth to facilitate broadband capacity; lower infrastructure costs from less tower requirements; and interference free communications. In addition, the 700MHz band will be available nation-wide, enabling cross-border interoperability with U.S. public safety responders.

5.3.16 With particular regard to technical specifications, by definition, broadband communications require a broad channel. Correspondingly, in Canada, there is very little vacant spectrum that is open to public safety, in the 1 kHz to 1 GHz range; resulting in a lack of contiguous spectrum availability, to meet the operational capacity required for broadband communications. While there may be some opportunity for on-scene “hot-spot” broadband implementation in the higher GHz bands, including the 4.9GHz band, the reduced coverage footprint and the related increase in infrastructure costs, make this spectrum much less favourable for any wide-area public safety use.

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

- (a) between various Canadian public safety agencies;
- (b) between Canadian and U.S. public safety agencies

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(a) between various Canadian public safety agencies;

5.4.1 The need for public safety radio interoperability has been well documented over the past several years, and is evident from Canadian major events such events as: Air France Flight 358 at Lester B Pearson airport; Hurricane Juan in Atlantic Canada; Swissair Flight 111 in Nova Scotia; 2010 Olympic Winter Games in British Columbia; and the 2010 G8/G20 Summits in Ontario, to name but a few. Despite the existence of these large scale events, thousands of incidents requiring mutual aid and coordinated response occur on a daily basis. In order to meet these demonstrated interoperable needs, the Tri-Services are advocating that Industry Canada allocate a contiguous nationwide block of spectrum for broadband applications. This will ensure the existence of an interoperable public safety communications system, and guarantee the functionality of broadband user devices on any public safety network in Canada.

5.4.2 Further evidence in support of this crucial interoperable need, is derived from the recently released Federal publication, titled: “Communications Interoperability Strategy for Canada ”. This is a strategy driven from the universal need of public safety first responders, to have the capability to communicate with each other quickly and efficiently, regardless of location. This includes not only day-to-day operations and localized responses, but also coordinated actions for larger scale events/disasters, occurring anywhere in the country. As evidenced throughout this document, this capability could easily be implemented using a standards-based, wireless

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broadband deployment across the country. The establishment of this system, would enable first responders arriving at a disaster scene from well outside of their normal operational jurisdiction, to immediately begin communicating using their existing wireless devices on the local network.

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

5.4.3 The Public Safety Canada and US Department of Homeland Security sponsored Cross Border Interoperability conferences have consistently expressed the need for increased communication interoperability during situations necessitating cross-border mutual response and for situations where communications are required between agencies for coordination across the border. Equally important, many Canadian communities have established bilateral agreements for medical trauma care in the US. Having a lack of interoperable communications can delay urgent medical treatment, via lost or delayed communications and the inability to reach medical dispatch centres across the Canadian-U.S. border. This problem is further complicated during the extremely time sensitive airborne Medevac transportations. Mutual aid agreements presently exist for shared disaster response along the Region of Niagara USA border, but little exists in the way of common wireless communications infrastructure. The deployment of 700MHz interoperable broadband would greatly improve this situation, and reduce the potential for lost lives.

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5.4.4 With Canada and the U.S. in the midst of negotiating a 2011 plan for the establishment of a North American Security Perimeter, the concept of cross-border interoperability becomes paramount. This plan would envision the joint patrol of the 8,893 kilometres of shared Canadian-U.S. territorial border. In addition, the Federal Communications Commission (FCC) in the U.S. has recently mandated the use of LTE technology for 700 MHz public safety broadband systems; thus setting the precedent and communications standard for public safety agencies in Canada to align with.

5.4.5 In order for both countries to respond cohesively to cross-border related events, it is imperative that the 700MHz Canadian public safety broadband spectrum allocation align with the U.S. band plan identified in SME-018-10, Figure 5.7 -Canadian and U.S. Band plan for Public Safety (which includes 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, and eliminate the possibility of frequency incompatibility or interference. This not only provides the requisite cross-border interoperable functionality, but also creates a much larger market for specialized public safety devices through economies of scale, shared transmission sites, and decreased equipment costs.

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

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- 5.5.1** At present, Canadian public safety agencies face numerous challenges, when attempting to achieve communications interoperability with their partners across the Canada-U.S. border. These include, but are not limited to: inadequate availability of common spectrum; disparate communications equipment; lack of universal infrastructure development; and regulatory restrictions that impede the free-movement of user equipment for mutual aid responses.
- 5.5.2** By way of illustration, in general, Canadian public safety agencies operate in different frequency bands from their counterparts across the border. The spectrum allocation plans for Canadian and U.S. public safety are not aligned in many of the land-mobile bands and have evolved differently in both countries with divergent services being authorized across the border. These disparate bands also lack established common channels for the purpose of first responder interoperability. Due to band congestion along the border, the identification and coordination of shared channels becomes a very difficult and very lengthy process. This constitutes a significant impediment for first responders, in the provision of timely and effective emergency response.
- 5.5.3** Despite these challenges, the creation of the 700 MHz public safety broadband system in conjunction with the adoption of a shared interoperable technical standard, holds promise for channel synchronization between Canada and the U.S. To this end, the 700MHz broadband band plan must be harmonized to the greatest extent possible and must be kept in the adjacent block to the existing narrowband allocation. This will not only facilitate cross-border interoperability, but

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will also create the economies of scale necessary to develop the unique devices required by public safety agencies; including devices that will function in both narrowband and wideband modes.

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

5.6.1 The Tri-Services firmly believe that priority access rights alone are insufficient to guarantee public safety requirements. In order to ensure that advanced life-saving mechanisms exist, public safety agencies must have unrestricted access to the 700 MHz broadband spectrum. Public safety agencies must be assured that they are afforded the highest priority during emergency situations. In order to protect the public and perform their job efficiently and effectively, public safety users require guaranteed access to the communications networks they use. Total reliance upon priority and pre-emption agreements with commercial networks remains an unacceptable and costly solution. During emergencies these networks often fail due to congestion or infrastructure breakdown, since they are not scaled nor engineered to the mission critical demands of first responders.

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5.6.2 Licensing and control of the 700 MHz broadband spectrum is critical. Spectrum dedicated exclusively to public safety will make certain that industry build wireless broadband networks focused upon the interoperable and National standards needs of first responders. By design, these networks would be technologically robust, to ensure greater levels of reliability, functionality and resilience. To ensure that these critical communications needs are met, the Tri-Services are advocating a public safety owned and managed wireless broadband network.

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

5.6.3 Although a means of priority access and pre-emption may be plausible and available in the broadband standards, it is difficult to imagine that a commercial service provider would be able or willing, to continually alter, modify, or augment their system’s traffic priority, capacity, or capabilities, at the rapid pace of which situation priorities change during a major disaster or significant response from multiple public safety agencies. Without direct, user-controlled prioritization, the first agency operating on scene on a commercial network may end up dominating all the available capacity; thereby “starving out” other critical agencies that subsequently arrive.

5.6.4 Public safety inherently requires a customer driven delivery model that cannot be easily accommodated on a consumer-based system. Because public safety users would represent only a

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small percentage of a carriers’ user base, it would be difficult for a carrier to implement functionality and to maintain a sufficient reserve of network capacity that is specifically geared to such a small sub-set of their market. The commercial users on the shared network would also have to be willing to accept that their access would be restricted during incidents when public safety users require the majority of network capacity. The Tri-Services believe that this is a crucial reason why wireless priority access has not been widely implemented, and is carefully managed today through the use of an Industry Canada registry.

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

5.6.5 Commercial systems are not typically designed to meet public safety’s mission critical requirements. Public safety networks require levels of coverage, network availability, and network reliability that must be considered when designing these networks from the outset. Commercial networks are designed to meet a completely different technical model, based on less stringent expectations of the commercial user base who are accepting of outages and coverage deficiencies.

5.6.6 Public safety networks require complete coverage in all areas of their responsibility, regardless of the user volume, population density, or site availability. Carrier networks typically provide their best coverage in urban areas where they have the largest concentration of users, which provides the greatest return on their infrastructure investment. In contrast, rural areas are

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therefore typically underserved with poorer coverage, especially in areas away from traffic corridors.

- 5.6.7** Network availability or Grade of Service (GoS) is also a critical design parameter for public safety networks. These networks must have sufficient built-in capacity for the busiest traffic periods, including large incidents and disasters, as it is not acceptable to have network blocking or queuing delays. This additional capacity is well above the average daily requirement and requires additional overhead costs to implement. It is unlikely that commercial networks would consider this unless specifically designed and funded to accommodate this. With the ever increasing consumer and commercial demand for wireless capacity, it is highly unlikely that a commercial operator would limit the volume of users on their networks, so that capacity could be held in reserve for public safety users.
- 5.6.8** Public safety network designs also require a high degree of network reliability. Site and coverage outages for any duration of time, regardless of the circumstance, are simply not acceptable. In this capacity, prevention requires many additional expenditures, including: battery and generator back-up facilities; backhaul facilities with hot-standby and alternate routing; and radio architecture designs that are fault tolerant and which include redundant control systems and complete remote site monitoring capabilities. As stated previously, typically, commercial networks do not incorporate all of these considerations for the commercial grade user service, as they are not demanded by the general public, and are extremely cost prohibitive.

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

5.6.9 The Tri-Service does not believe that Industry Canada should mandate rules to make commercial networks viable for public safety operations. This would require a complex control and enforcement mechanism that would be complicated by inter-carrier agreements, presenting too much risk for public safety users. The preferred system would see public safety agencies in control of dedicated communications systems using dedicated broadband spectrum.

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.

5.7.1 Please see our response to section 5.3 (b)

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.

5.8.1 The Tri-Service does not foresee the initial development of a single national network. Instead, the more realistic option would be the development of a national “system-of-systems”, where

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there would 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, as called for in the CISC.

700 MHz Band Plan Architecture for Public Safety Systems

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.

5.9.1 We recommend that Industry Canada adopt Option 3: 10+10 MHz designated for Public Safety.

This is the preferred option as it is the only alternative that provides a dedicated block of sufficient spectrum to support the long-term capacity requirements for public safety broadband networks.

We do not believe that a broadband system based on a 5+5 MHz block defined in Option 1 will provide the capacity necessary as discussed in our response to question 5.3. The shortfalls of Option 2 considering priority access on a commercial system are discussed in our response to question 5-6.

5.9.2 Historically, to accommodate demonstrated communications needs, public safety has been allocated narrow portions of spectrum spread across many different bands. These narrow

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allocations create logistical interoperability challenges and capacity limitations that cannot be repeated with broadband spectrum allocations.

5.9.3 With broadband technologies like LTE, spectral efficiencies greatly increase with the use of wider bandwidth channels. A single 10+10MHz channel will support a much greater throughput than two separate 5+5MHz channels making it all the more imperative that the initial allocation of spectrum be as broad as possible (see our response to question 5.3). Not only will it be inefficient to allocate a single 5+5MHz block today to satisfy short-term capacity requirements, but future allocations will only become available in a different part of the spectrum. Not having adjacent spectrum on the public safety broadband network will not only recreate future public safety interoperability issues, but may also increase public safety equipment costs, due to unique hardware requirements capable of using combinations of public safety bands. In effect, this would eliminate the economies of scale sought in a National Interoperable deployment, and increase the cost of public safety communications.

5.9.4 The allocation of the 700 MHz spectrum is a one time opportunity to eradicate the inefficiencies in Canada’s public safety communications capabilities. It is critical that Industry Canada allocate the full 10+10 MHz of broadband spectrum in 700 MHz to public safety agencies.

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?

5.10.1 As indicated in our response to 5.6 (c), the Tri-Services do not agree that commercial operators be mandated to support public safety services.

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?

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

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.

(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?

5.11.1 The existing narrowband channelling established in SRSP511 was designed to align with the American band plan incorporating a 30MHz duplex separation assigning the uplink mobile transmitters to the upper frequencies (798 to 806MHz), and downlink base transmitters to the lower frequencies (768 to 776MHz). Based on this band plan, current narrowband systems being manufactured for the North American market would not be able to accommodate a shift in

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channelling to align with the APT plan. This is not only due to the differing duplex separation (55MHz), but also due to the reverse configuration of the uplink and down link partitions incorporating mobile transmitters on the lower frequencies and base transmitters on the upper frequencies.

5.11.2 The adoption of the APT band plan in Canada would therefore necessitate the production of unique communications equipment for the Canadian Public Safety marketplace, which is highly unlikely. This concern is highlighted by the fact that many Canadian Public Safety agencies are now well into the purchasing process for the 700MHz narrow band systems, and the accompanied product designed to the established band plan. Even if manufacturers could modify existing products, or could be convinced to produce unique products for Canada, the costs of delaying implementation, and higher hardware production costs due to smaller economies of scale, would be significant and therefore not acceptable.

5.11.3 Another major consideration if the band plan does not align with the American plan is cross-border interoperability. The existing Industry Canada SRSP 511 band plan sets out interoperability channels that are common on both sides of the border, so that Public Safety responders can easily interoperate when responding to incidents at or near the Canada US border. These efforts to harmonize interoperability channels have been sponsored by Public Safety Canada and the Department of Homeland Security in the U.S.

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5.11.4 The Tri-Services are not aware of any available, suitable, alternative spectrum allocation for Public Safety radio systems, if the APT plan is adopted and narrowband excluded due to the lack of equipment availability. The demand for additional narrowband spectrum is immediate. Incurring additional and lengthily delays to identify and transition to an alternate spectrum allocation is simply not acceptable.

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

5.11.5 If the APT plan was actually adopted, Public Safety would request a minimum 10+10MHz broadband allocation as addressed in our responses to questions 5.3 and 5-9. The narrowband allocation of 8+8 MHz (including guard bands) would also have to be accommodated.

5.4 Treatment of Existing Spectrum Users

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

5.14.1 The provision of one- or two-year notification periods for LPTV stations to transition to alternate channels does not align well operationally for 700 MHz radio users who could be called to respond to any location, and from any location in the country at a moment’s notice. For public safety radio systems, rural areas are as important as urban areas and differing transition

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notification periods, depending on the LPTV station location, could cause implementation delays including the use of the nation-wide capable channels defined in the Industry Canada SRSP-511. We therefore recommend that Industry Canada initiate discussions with the LPTV stations that may exist within the public safety narrowband, as well as the future broadband allocation with a view to negotiating specific termination or transition dates as soon after August 31, 2011 as possible.

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.

5.15.1 The Tri-Services agree with the proposed end dates for licensing of these devices, and remain concerned with both licensed and unlicensed wireless microphone devices that may continue to operate in this spectrum. To this end, the Tri-Services are advocating that the department begin a notification campaign to inform the community of the March 2012 deadline.

6. Changes to Canadian Table of Frequency Allocations

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

6.1.1 The Tri-Services agree with the proposed changes to the Canadian Table of Frequency Allocations.

6-2. The Department seeks comments on the spectrum utilization policy proposed above.

6.2.1 The Tri-Services agree with the proposed CMRS designation for the commercial services that may be allocated in this band. Please note that SP-768 has already designated 768-776MHz and 798-806MHz for public safety use.

7.1 Possible Need to Promote Competition

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?

Provide supporting evidence and rationale for all responses.

7.3.1 No. The Tri-Services remain convinced that with the dedication of public safety owned and controlled 700 MHz broadband system, that normal business factors and economies of scale, will

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provide their own incentives to induce normal practices of competition for service provision.

Mandating competition and/or the adoption of superfluous regulations, could have a negative impact and deter potential providers.

8. Promoting Service Deployment in Rural Areas

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.

8.1.1 The Tri-Services remain adamant that broadband coverage should be universal across Canada, regardless of service area or population density. Having an a 10+10 MHz 700MHz broadband allocation will enable the Tri-Services and their corresponding regional, provincial and national counterparts, to utilize the inherent benefits of this spectrum, to increase public safety service provision and expand coverage areas.

8.1.2 As previously mentioned, with reference to the spectrum bands currently available to public safety, the propagation characteristics associated with the 700 MHz broadband spectrum offer public safety and tax payers several key benefits, namely: interference free communications; greater penetration of obstacles, buildings and foliage regardless of environmental conditions; less dependence upon line-of sight transmission; and perhaps most importantly, lower costs, as

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signals travel farther, requiring fewer towers and infrastructure builds. Infrastructure cost has and remains a serious impediment to the provision of wide-area public safety communications coverage.

8.1.3 The Tri-Services will seek to work with existing governmental programs to ensure communications compatibility and the efficient utilization of broadband programs. The allocation of the 10+10 MHz 700 MHz public safety broadband request, proposed by the Tri-Services, is compatible with the establishment of the national broadband service currently being implemented by the Federal and Ontario Governments of Canada. By way of illustration, through Canada's Economic Action Plan, the federal government is providing \$225 million over three years to develop and implement a strategy for extending broadband coverage to as many unserved and underserved communities as possible beginning in 2009-2010. This investment reflects the government's commitment to closing the broadband gap in Canada by encouraging the private development of rural broadband infrastructure.

8.1.4 The Broadband Canada program is an initiative that provides federal funding via a contribution program to increase the availability of broadband Internet services to Canadian households within defined geographic service areas. At the launch of the Program, it was estimated that 94 percent of Canadian households had access to a minimum of 1.5 Mbps connectivity. The remaining 6 percent were considered unserved (no access to the Internet or dial-up service only) or underserved (broadband speeds of less than 1.5 Mbps) and live in remote and rural regions of

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Canada. The allocated budget is being used to connect as many of these households as possible to broadband services.

This federal program is complemented by a \$55 million dollar Ontario Government initiative to create an infrastructure build, designed to establish a permanent broadband network across Eastern Ontario.

8.1.5 As noted by the Federal Government in the publication titled: “Broadband Canada: Connecting Rural Canadians-Canada’s Economic Action Plan”, closing the broadband gap in rural and remote Canada is a sound economic investment. The Tri-Services are confident that not only will these investments in broadband infrastructure enhance communities' competitiveness and create higher value-added jobs, partnering with this initiative will enable the creation and deployment of a dedicated public safety broadband network.

8.1.6 In summary, the Tri-Services will develop key partnerships with existing provincial/federal programs, and utilize newly established broadband infrastructure to minimize unnecessary system builds and cost, while simultaneously providing a level of enhanced communications safety and security unseen in these remote areas.