



February 28, 2011

Ms. Cindy Cook
Manager
Mobile Technology and Services
Industry Canada
300 Slater Street
Ottawa, Ontario K1A 0C8

Subject: Canada Gazette Part 1 Notice No. SMSE-018-10
Consultation on a Policy and Technical Framework for the 700 MHz Band
and Aspects Related to Commercial Radio Spectrum, Published on
December 4, 2010

Dear Ms. Cook,

Motorola Canada Limited (Motorola) commends Industry Canada (IC, the Department) for examining the needs of public safety for broadband spectrum in the upper 700 MHz band, within the Department's Consultation on the potential commercial use of 700 MHz band. Motorola hereby submits these Comments in response to this Consultation.

EXECUTIVE SUMMARY

Motorola has a long history of supporting the public safety community in Canada and around the world with state of the art wireless mission critical communications networks. Motorola has worked closely with Canadian public safety agencies and their lead associations, the Canadian Association of Chiefs of Police (CACCP), the Emergency Medical Services Chiefs of Canada (EMSCC), the Canadian Police Research Centre (CPRC) and the Canadian Interoperability Technical Interest Group (CITIG), to understand public safety user communications requirements for voice and data, including the need to wirelessly access and transmit large data files, images and real time video, and to do so on networks and devices built to meet public safety's harsh mission critical environment.

Commercial wireless data traffic is increasing exponentially and is driving enormous demand for more commercial broadband spectrum. In order to meet public

safety's mission critical requirements, public safety grade broadband networks must be built to much more stringent demands that provides control, priority and capacity, coverage (beyond commercially viable areas), reliability, security and survivability, enhanced public safety feature sets and even interoperability with public safety's mission critical narrowband land mobile radio (LMR) voice networks. As detailed herein, public safety agencies must also have broadband networks that provide seamless interoperability both across Canada and cross border with U.S. public safety agencies. History in North America and Canada has demonstrated that during major events and/or during times of catastrophic incidents, communications on commercial grade networks are severely challenged if not completely incapacitated, just when the need for public safety agencies to interoperate on voice and data communications peaks.

While we address the specific Consultations questions in much greater detail, Motorola is highlighting five major points for Industry Canada to consider in its deliberation:

1. Motorola urges Industry Canada to recognize the importance of harmonizing the 700 MHz band plan and technical rules with those of the Federal Communications Commission (FCC) in the U.S., especially the public safety segment of the band plan. Motorola has long endorsed the need for harmonization of spectrum, regulatory policies and technical rules between Canada and the U.S. We were among several respondents to the SMSE-004-08 Consultation stating harmonization with the United States is critical for radio equipment economies of scale and for interoperability.¹ Harmonization will lead to increased equipment availability and lower cost for public safety broadband networks.
2. Motorola urges Industry Canada to recognize Canadian public safety broadband needs over the long term and allocate the full 10+10 MHz block to public safety from

¹ Motorola Comments, March 4, 2008, to Canada Gazette Notice No. SMSE-004-08, Proposed Revisions to Frequency Plan for Public Safety in the Band 700 MHz, published Jan. 19, 2008, p2. Other Commenters urging harmonization included the Radio Advisory Board of Canada, APCO Canada, the Royal Canadian Mounted Police, the State of Michigan Department of Information Technology, and the National Public Safety Communications Council.

the start. Public safety has only one opportunity to obtain this much needed contiguous broadband spectrum in the 700 MHz band. If the Department auctions the spectrum to commercial broadband carriers and providers, it will be lost forever to public safety.

3. U.S. public safety leadership recognizes this broadband need in the U.S. and is securing growing support in the U.S. Congress and with the White House Administration to have the FCC allocate a total of 10+10 MHz (not just the 5+5 MHz already allocated) for a nationwide public safety broadband network. Public safety studies, including models by Motorola, show that a 5+5 MHz broadband block will not provide sufficient capacity to support identified broadband applications demanded at most major levels of incident scene.
4. The question is not whether commercial carriers are able to build higher grade broadband networks and devices that meet most public safety's mission critical requirements, the question is whether carriers will elect to do so. Public safety requirements such as dynamic prioritization (including guaranteed instant access and capacity), coverage, control, reliability, survivability do not fit the business models of commercial carriers, and providing such higher cost networks and services puts a carrier at a competitive disadvantage to those who do not.
5. Motorola urges Industry Canada to retain the four 1 MHz blocks acting as guardband between public safety narrowband and commercial/public safety broadband spectrum, as defined in its April 2010 release of SRSP-511.² We also recommend a 1 MHz guardband between the commercial broadband block and the public safety broadband block, whether the decision is for a 10+10 MHz or a 5+5 MHz broadband block for public safety.

² SRSP-511, Issue 2, Technical Requirements for Land Mobile Radio Services Operating in the Bands 768-776 MHz and 798-806 MHz, released April 2010.

INTRODUCTION

Commercial wireless data traffic is increasing exponentially and is driving the enormous demand for more commercial broadband spectrum. The Canadian Wireless Telecommunications Association has projected that data traffic on wireless networks is expected to double every year through 2014, as more Canadians use more devices that consume more bandwidth.³ Data experts such as Cisco report that global mobile data traffic grew 2.6 fold in 2010, and includes the following in their estimates: global mobile data traffic will increase 26 fold between 2010 and 2015; mobile video will represent two-thirds of all mobile data traffic by 2015; and machine-to-machine data traffic will increase 40 fold by 2015.⁴

As an increasing number of Canada's first responders are using these devices in their personal lives, they are asking why public safety agencies cannot provide them with the advanced high speed data and video services that can provide the mission critical applications they need to make their professional lives more secure, efficient and effective. With the current implementation of the newest commercial broadband technologies in the U.S., public safety leaders in both Canada and the U.S. have identified an increasing need to access these fourth generation (4G) wireless data and video networks – both out in the field and for better situational awareness in incident command. In order to meet public safety's mission critical requirements, these networks must be built to a higher public safety grade that provides control, priority and capacity, coverage, reliability, security and survivability, and even interoperability with their mission critical narrowband voice networks.

Public safety leadership in the U.S. has chosen the 4G Long Term Evolution (LTE) technology for their nationwide public safety broadband network, and just last month the FCC mandated LTE for use in these 700 MHz public safety networks.⁵ One of

³ Ottawa Citizen, January 26, 2011, article by Ian MacLeod titled "Emergency services call for more broadband".

⁴ Cisco, Global Mobile Data Traffic Forecast Update, 2010-2015 (Feb. 1, 2011), see www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-520862.pdf

⁵ FCC Third Report and Order and Fourth Further Notice of Proposed Rulemaking, multiple dockets

the primary considerations for choosing LTE was that major commercial carriers both in the U.S. (including Verizon and AT&T) and elsewhere in the world have declared that they have adopted LTE for their 700 MHz commercial networks. Further, the U.S. already completed its digital TV transition on June 12, 2010 thereby clearing the entire 700 MHz band of all high power television broadcasts. This freed up both the commercial spectrum (for which carriers paid \$19 Billion) and the public safety spectrum in that band, allowing implementation of broadband networks by both carriers and public safety. These networks will include millions of LTE devices and the related infrastructure to support them. Public safety agencies thereby will gain economies of scale from development, upgrade and production of such devices and networks that will make state-of-the-art LTE equipment available both sooner and at a lower cost. As noted in the Consultation, the Canadian Radio-television and Telecommunications Commission (CRTC) ordered that all full-power TV broadcasters must cease operations in the 700 MHz band in Canada no later than August 31, 2011, which is six months from today. The date certain clearing of the 700 MHz band has created similar certainty, demand and opportunity for commercial carriers and public safety agencies to implement broadband networks in Canada.

CONSULTATION QUESTIONS

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?
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With respect to the need for guardbands, it is important to separate this question into two distinct categories:

1. Guardbands separating public safety narrowband spectrum from either commercial or public safety broadband spectrum. Industry Canada recognized the need for these four 1 MHz guardbands in its April 2010 release of SRSP-511. 768-769 MHz and

including PS Docket No. 06-229, Implementing a Nationwide, Broadband, Interoperable Public Safety Network in the 700 MHz Band, released Jan. 26, 2011.

798-799 MHz provide separation between the proposed public safety broadband spectrum proposed in this Consultation and the public safety narrowband spectrum immediately above. 775-776 MHz provides separation between the commercial broadband spectrum proposed in this Consultation and the public safety narrowband spectrum immediately below. Although the Department did not label these blocks specifically as guardbands, allowing them to be channelized into aggregatable 6.25 kHz narrowband channels, it did limit the use of these blocks pending further Consultations to evaluate their potential interference from adjacent broadband technology. 805-806 MHz was defined by the Department for simplex use because the block immediately above it is also a narrowband block. All four of these 1 MHz blocks are aligned with the guard bands defined by the FCC in the U.S. 700 MHz public safety narrowband spectrum plan. Though these do not appear to be addressed in Question 5-2, they must be retained to minimize interference between narrowband and broadband technologies, and to have the IC public safety band plan harmonized with the FCC band plan.

2. Guardbands separating public safety broadband spectrum from commercial broadband spectrum. When the FCC created the concept of a public/private partnership between the D Block auction winner and public safety broadband licensee, it removed a 2 MHz guardband (761-763 MHz and 791-793 MHz) which originally separated the D Block from public safety spectrum, and instead created a 1 MHz guardband (757-758 MHz and 787-788 MHz) between the commercial C block and the D block.⁶ Because the D Block and the adjacent public safety broadband block were going to form the basis of a combined public/private broadband network, it no longer needed to be separated by a guard band. U.S. public safety leadership has been urging the FCC to reinsert that 1 MHz guardband between the D Block and the public safety broadband block if Congress and the FCC do not reallocate the D Block to public safety. This will be necessary to minimize the interference between the

⁶ FCC Second Report and Order, released August 10, 2007, under eight different Dockets, including Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communications Requirements Through the Year 2010, WT Docket No. 96-86.

resulting commercial only D Block broadband network and the public safety broadband network. Motorola analysis concludes that without a guardband there will likely be both coverage outages and throughput degradations to public safety fixed and mobile devices. These interference issues are particularly problematic when public safety broadband devices are in proximity to D Block tower sites and pico/microcells when they are far from their own public safety broadband network tower sites. This is often referred to as near/far interference.

Options 1, 2a and 2b proposed by Industry Canada in Section 5-1 all propose the same 1 MHz guardband ((757-758 MHz and 787-788 MHz) as the current FCC plan. Motorola urges Industry Canada to follow the same recommended guardband guidelines. If the Department designates 10+10 MHz for public safety (public safety Option 3 in Section 5.2), then the 1 MHz guardband currently identified by the Department should stay as is. If the Department designates 5+5 MHz for public safety (public safety Option 1 in Section 5.2), then the 1 MHz guardband should be relocated to 762-763 MHz and 792-793 MHz to separate the commercial block from the 5+5 MHz public safety broadband block immediately above it. We further urge the Department not to auction these guardbands, but to instead hold them in reserve.

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| <p>5-3 Do public safety agencies need spectrum for broadband applications? If so:</p> <ul style="list-style-type: none">(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? |
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As noted in the above Introduction and by Industry Canada itself, the demand for broadband spectrum is skyrocketing. Public safety agencies are competing with commercial carriers for the much needed 700 MHz spectrum. Commercial carriers are much better funded than public safety agencies and, as in the U.S., are willing to spend billions of dollars in spectrum auctions to be able to build future business opportunities through these broadband networks. Public safety in Canada recognizes that it must convince its regulators and elected officials to forego a small portion of this potential

auction revenue in order to receive an allocation of some of the 700 MHz spectrum. Spectrum for public safety is the enabler of mission critical communications, and, as recognized by Industry Canada in the Consultation, communication among public safety agencies is imperative, particularly in the event of an emergency or disaster.⁷ For public safety and the Canadian public and taxpayer, the cost due to lack of spectrum is measured in potential lives lost, injuries suffered and property damage sustained. If 700 MHz spectrum is auctioned to commercial providers, it is gone forever for public safety. First responders must have access to broadband technologies that will be out there in the very near future, but agencies will not be able to implement them if Industry Canada does not expeditiously allocate the 20 MHz of spectrum to public safety.⁸

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

As further detailed in Section 5-9, Motorola urges Industry Canada to allocate a contiguous 10+10 MHz block of spectrum for dedicated public safety broadband applications. Public safety broadband requirements must be considered over the long term, as noted by a Verizon Wireless executive in his testimony before a U.S. Congressional subcommittee on public safety broadband spectrum requirements last year. “In order to successfully take advantage of these capabilities, the proposed nationwide public safety broadband network must have sufficient capacity to meet public safety’s communication needs over the long term. Even the FCC has conceded that public safety will require more than 10 MHz of spectrum in the future”⁹

While many applications are currently envisioned by public safety, future applications will undoubtedly evolve as broadband use by public safety becomes everyday reality. Widespread rollout of commercial LTE broadband networks in the 700 MHz band is also likely to create new applications and LTE devices that will provide opportunities for first responders to adopt similar public safety grade solutions.

⁷ Gazette Notice No. SMSE-018-10, Consultation on a Policy and Technical Framework for the 700 MHz Band and Aspects Related to Commercial Mobile Spectrum, Published Dec. 4, 2010. P23.

⁸ Ottawa Citizen, January 26, 2011, article by Ian MacLeod titled “Emergency services call for more broadband”.

⁹ Stephen E. Zipperstein, Vice President and General Counsel, Verizon Wireless, in June 17, 2010 testimony to Committee on Energy and Commerce, Subcommittee on Communications, Technology and the Internet, U.S. House of Representatives.

Broadband applications that have been identified by public safety can generally be categorized by the type and intensity of the incident. These include the following:

Day-to-Day Operations:

Traffic Stops, EMS Incidents, Car Fires, Patrol, Inspections

- Data Dispatch
- Automatic Vehicle Location
- Records Lookup
- Traffic Citations
- Resource Tracking
- Real-time Field Supervision
- Operational Video
- Machine-to Machine
- Patient Care Reporting
- Incident Reporting

Incident & Event Management:

Demonstrations, Special Events, Hazardous Materials Incidents

- Tactical Video
- Analytics
- Perimeter Controls
- Hazardous Materials Queries
- Data Dispatch
- Automatic Vehicle Location
- Records Lookup
- Traffic Citations
- Resource Tracking
- Real-time Field Supervision
- Asset Management
- Machine-to Machine

Catastrophic Incident:

Hurricane, Bridge Collapse, Major Fire

- Fixed, Hot Zone, Personal, In-Car Video
- Remote Provincial and Federal Database Lookups
- Remote Applications
- Fixed, Deployed Sensors
- Detection of CBRNE Threats
- Personnel Information
- Automated Vehicle Location
- Electronic Command Board
- Fireground Management
- Computer Aided Dispatch
- Triage Applications
- Telemetry

- Internet Access
- VoIP Communications
- Mobile Data
- Asset Management
- Evacuee Tracking

As further detailed in Section 5-9, public safety leaders in the U.S. are urging Congress and the FCC to look at their long term broadband communications requirements, as part of public safety's efforts to get the D Block spectrum reallocated to them. At the 2010 Annual Meeting of the Police Executive Research Forum (PERF), many of the largest cities' police leadership spoke to their broadband plans and envisioned applications. For example:

“We are looking not only at what we have today, but what we'll be doing in the future. We can see the exponential growth in critical applications – chemical monitoring, road temperature gauges, multiple streams of video that actually capture what is going on inside a burning building, building floor plans and cameras on firefighters so we can see the movement of the firefighters on those floor plans, and we know where they are located, so if something happens to them, we can know about it immediately and prevent line-of-duty deaths. At some point we'd like to tap into security cameras in buildings, to actually see inside the building on multiple floors simultaneously, for the incident commander to understand the magnitude of the fire. One day I see us having cameras on every police officer, every firefighter, every medic. You'll be able to see what they see, so when police officers are going into a building where there's an active shooter, the commanders will be able to see what they are dealing with and make better decisions about how to manage the situation. But it's only going to be as successful as the network that we operate on. With these decisions about spectrum that we are making today, we are deciding not only what we'll be able to do today, but what will happen to those who come after us.”¹⁰

¹⁰ Fire Chief Charles Werner, Charlottesville, Virginia at the PERF Conference on Broadband Spectrum, April 15-17, 2010, Philadelphia, PA; as published in Subject of Debate, the PERF Newsletter, Vol. 24. No.3, March 2010..

Motorola developed a model to characterize public safety's broadband wireless needs by drawing upon existing policies and recent incident feedback.¹¹ For purposes of illustration, Motorola considered three major levels of hazardous materials incidents, and identified the expected public safety response (detailed number of vehicles and personnel) for each level based on State of Illinois mutual aid response procedures and National Fire Protection Association (NFPA) minimum standards for company response. Incident broadband demands were comprised of three general classes of usage:

1. Individual Computer Aided Dispatch Functions. These include overhead functions such as incident data, GPS information, biosensors and other status messaging and queries. These consist of relatively low downlink and uplink bandwidth for each station, but can be significant when aggregated for large number of personnel and vehicles
2. Incident scene database lookups, downloads and information searches. These include downloads of incident scene images, maps, manuals, building plans and any other data that is needed quickly as commanders initially assess the scene and develop an appropriate response strategy. The model assumes that all expected initial data is downloaded and available within the first 10 minutes of an incident.
3. Video including personal, vehicular and hot zone. These include personal video cameras at the incident hot zone, vehicular video cameras positioned around the incident perimeter, and situational video cameras deployed within the scene. Separate models were developed using two different rates:
 - Low Video Quality rate: 400 kbps for personal and hot zone cameras and 1.2 Mbps for in-car cameras.
 - Acceptable Video Quality: 1.2 Mbps for personal and hot zone cameras and 3.5 Mbps for in-car cameras.

¹¹ On April 9, 2010, Motorola presented the modeling analysis, methodology and results to the FCC Office of Engineering and Technology, the Public Safety and Homeland Security Bureau and the Wireless Telecommunications Bureau. Motorola Ex Parte filed on April 12, 2010, WT Docket 06-150 and PS Docket 06-229.

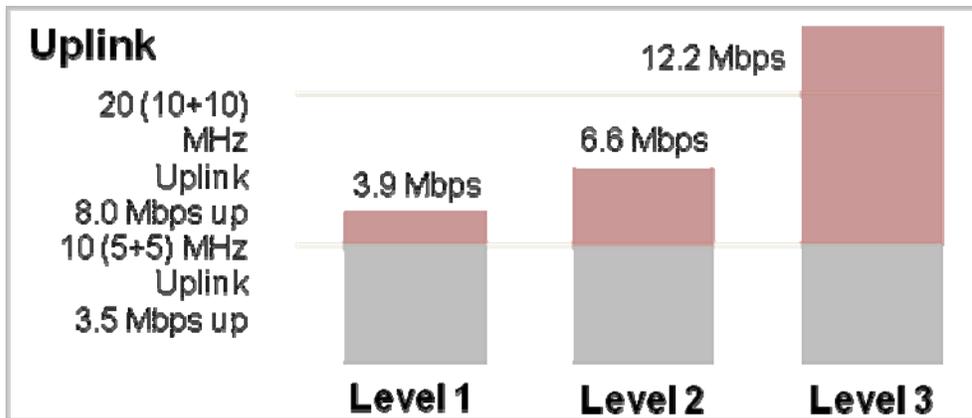
The total video streams are scaled with the size and complexity of the incident. The model uses video uplinked via the network and a subset of streams (switchable on command) downlinked to the on-scene command center.

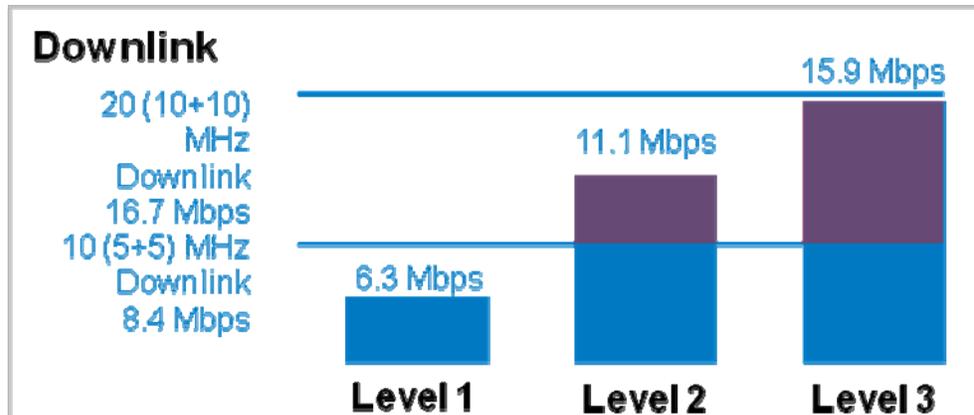
The model summarized the results of the analysis where the bandwidth demands for both uplink and downlink are compared to the expected average capacity of a single LTE serving sector. Performance at an incident scene that is at the LTE cell edge would be considerably less. Performance under optimistic condition peak rates can be much higher. A background load of 20% was added to the total demand. We assumed this would be the minimum base load for non-incident related nominal activities across the sector coverage area.

Results:

Low Video Quality

Public Safety Broadband Utilization Hazardous Materials Coordinated Mutual Aid

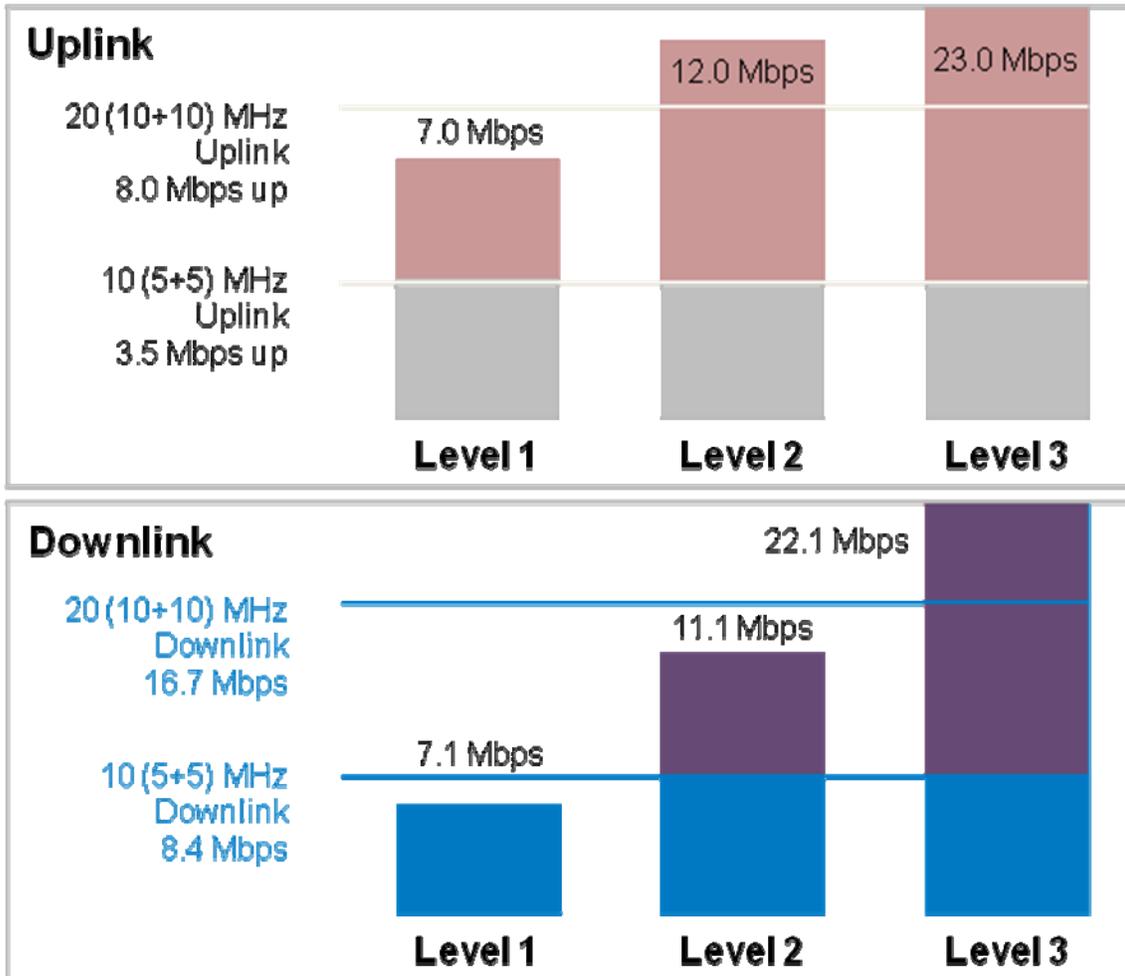




At low video quality rates: 10 MHz of public safety broadband spectrum (the 5+5 MHz allocated in the U.S. today) is only sufficient to service the downlink demands of a Level 1 incident. It is insufficient to handle the uplink demands of any incident level and the downlink demands of Levels 2 and 3 incidents. 20 MHz of public safety broadband spectrum (10+10 MHz) can service the uplink and downlink demands of all 3 incident levels except for the Level 3 incident uplink demand.

Acceptable Video Quality

Public Safety Broadband Utilization Hazardous Materials Coordinated Mutual Aid



At acceptable video quality rates: Similar to low video quality models, 10 MHz of public safety broadband spectrum is barely sufficient to service the downlink demands of a Level 1 incident. It is insufficient to handle the uplink demands of any incident level and the downlink demands of Levels 2 and 3 incidents. 20 MHz of public safety broadband spectrum is essential for all levels, and even then is still insufficient to service the downlink demands of a Level 3 incident and the uplink demands of Levels 2 and 3 incidents.

The conclusion drawn by this analysis is that even with the very realistic current demands demonstrated in the model, public safety requires at least 20 MHz to provide the minimum needs of broadband capacity at a major incident.

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

Because of the ideal propagation characteristics of the 700 MHz band, providing both longer range and in-building coverage, Motorola agrees with the Canadian public safety community that there really is no other spectrum, especially in the highly coveted below 1 GHz range, that could be allocated to meet public safety requirements for wide area mobile broadband networks. Spectrum also has to be available in large channel bandwidths on a nationwide basis in order to enable an interoperable nationwide public safety broadband network.

Motorola notes that spectrum allocated to public safety in the 4.9 GHz band does not allow for economical implementation of wide area broadband networks because of the limited propagation distance of the radio signal. Broadband applications are better suited for hot spots, local and on-scene MESH networks and backhaul.

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.

The need for public safety interoperability has been a primary requirement of both Canadian and U.S. public safety leadership for many years, dramatically escalated by the events of September 11, 2001 in the U.S. To date, the main focus of interoperability has been on narrowband land mobile radio (LMR) voice and data systems. Public safety users also emphasize that interoperability does not stop at the international border. Canadian public safety users need interoperable communications among Canadian agencies within the country and with U.S. agencies at the border.

Public safety is emphasizing that the historic narrowband interoperability challenges not be repeated in creating an interoperable public safety nationwide broadband network. Public safety leadership in the U.S. has defined a nationwide wireless broadband interoperable network of networks. To ensure that public safety does implement broadband networks that are interoperable as first responders roam across these networks to assist each other, the FCC has issued numerous Notices of Public Rulemakings and subsequent decisions. This included establishment of the Emergency Response Interoperability Center (ERIC), conditional technical requirements placed upon Waiver Order grants to date, and most recently the mandate to use LTE technology and a list of required LTE interfaces.¹²

Recognizing the need to address interoperability, the Canadian Association of Chiefs of Police (CACP), the Canadian Association of Fire Chiefs (CAFC) and the Emergency Medical Services Chiefs of Canada (EMSCC) joined forces in 2007 with the Canadian Police Research Centre (CPRC) to create the Canadian Interoperability Technical Interest Group (CITIG). This initiative brought together representatives from public safety, industry (including Motorola), government and non-government organizations to address Canadian public safety interoperability. Working together with CITIG, Public Safety Canada developed the Canadian Communications Interoperability Plan (CCIP), which evolved into the Communications Interoperability Strategy for Canada. The Senior Officials Responsible for Emergency Management (SOREM) is responsible for overseeing this strategy and the accompanying Action Plan. Included in the strategy are data as well as voice interoperability and collaboration between Public Safety Canada and the U.S. Department of Homeland Security to improve cross border interoperability.¹³

¹² FCC Third Report and Order and Fourth Further Notice of Proposed Rulemaking , released Jan. 26, 2011.

¹³ See the Canadian Interoperability Technical Interest Group (CITIG) website www.citig.ca for detailed interoperability initiatives, including the Communications Interoperability Strategy for Canada document and Canadian Communications Interoperability Continuum

To help enable public safety broadband interoperability, both within Canada and with U.S. public safety at the border, Motorola urges Industry Canada to:

1. Allocate a contiguous block of 700 MHz broadband spectrum to public safety on a nationwide basis, and mandate the use of LTE technology for public safety interoperability in that band. This will allow public safety agencies to access and interoperate on the local public safety broadband network as they roam within any part of Canada or the U.S.
2. Harmonize with the FCC 700 MHz public safety band plan and rules. This will facilitate cross-border interoperability and allow broadband LTE devices to operate on broadband networks on either side of the border. There are numerous cases of agencies and citizens in one country receiving support from public safety agencies of the other country, generally through mutual aid agreements between the agencies. Public safety envisions the same level of cross border support with broadband data communications upon which they now rely on for narrowband voice and data communications. See Section 5-9 response for LTE interoperability between a 10 MHz channel and a 5 MHz channel.

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

The interoperability challenges faced by public safety in both Canada and the U.S. have been well documented over the past twenty years. One of the most complete studies and report was completed in the U.S. eight years ago by the National Task Force on Interoperability, supported by the U.S. Department of Justice.¹⁴ The task force included over 60 public safety and elected officials, and members of 18 national public safety and

¹⁴ Why Can't We Talk, Working Together to Bridge the Communications Gap to Save Lives, A Guide for Public Officials, prepared by the National Task Force on Interoperability, February 2003. See the following website for a complete copy of the report:
http://www.safecomprogram.gov/NR/rdonlyres/322B4367-265C-45FB-8EEA-BD0FEBDA95A8/0/Why_cant_we_talk_NTFI_Guide.pdf

government associations. The report provided five key reasons why public safety agencies can't interoperate:

1. Incompatible and aging communications equipment – this has since led to greater implementation of communications equipment based on the P25 standard
2. Limited and fragmented funding – still a major issue for all levels of government, especially in this economic environment.
3. Limited and fragmented planning – achieving interoperability requires agencies to start planning for it, including who needs to interoperate and how to fund the system.
4. Lack of coordination and cooperation – interoperability requires agencies to develop a governance model, policies and procedures, on how they will share systems, including management and control, and costs and benefits.
5. Limited and fragmented radio spectrum – Over the past seventy years, the FCC has staggered the allocation of narrowband spectrum in disparate frequency bands. For public safety, these bands include VHF, UHF, 800 MHz and most recently 700 MHz. As public safety narrowband capacity became more and more congested in one band and public safety agencies urged the allocation of additional frequencies, no adjacent channel blocks were available. As a result, the FCC had no choice but to provide additional blocks wherever they could find them.

While the above addresses interoperability issues in the U.S., the public safety agencies in Canada face the same interoperability issues, both within a region and across the border with U.S. public safety agencies. Communicating cross border is compounded in the VHF, UHF and 800 MHz bands by lack of common mutual aid (interoperability) channels at the border. It is critical that Industry Canada strongly considers these challenges by allocating 10+10 MHz of 700 MHz broadband spectrum to public safety for the future of Canadian public safety agencies' ability to perform in an increasingly complex information driven society.

<p>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.</p>
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(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?

Public safety networks are designed to meet the mission critical communications needs of the command centers and first responders. On the other hand, commercial carriers design their networks to provide consumers with competitive features and services, generally in high population areas that provide the largest number of potential subscribers. Because the public safety population typically represents a small percentage of those subscribers, commercial business models are very challenged to meet the mission critical needs of public safety. A carrier building and operating a higher grade network to meet public safety requirements would be forced to charge all customers a higher monthly rate to cover the increased cost of the expanded coverage, expanded public safety centric feature set and technical demands of such a network. These demands would place that carrier at a competitive disadvantage with the other carriers who elect not to do so. Many of these public safety centric network features will be of little incremental value to consumers, so many will choose another carrier to obtain a lower cost.

History shows that during large-scale events, both public safety and consumer traffic are at their peak. While public safety designs communications networks based on capacity needed for day-to-day operations, incident and event management, and even catastrophic incidents, communications capabilities on commercial networks during major events and incidents are severely challenged. As noted in the Introduction, the emergence of streaming video, high definition photography, social networking and mobile TV is creating enormous consumer demand for commercial network access. Carriers are increasingly competing to meet those revenue generating demands. It also means that first responders will face even bigger challenges competing with consumers for routine network access and needed broadband capacity. This is especially true during major incidents or events, such as the 2010 Winter Olympic Games, when thousands of

consumers also want to send videos and pictures of the events to friends and social networking sites.

5-6 a) Your views and comments are invited on priority access rights, including pre-emption, and on the feasibility of such a system.

The commercial LTE standard and technologies offer capabilities for priority with multiple access and priority levels, which would allow a high priority first responder device to get through on a congested network earlier than lower priority consumer devices. However, public safety officials will need pre-emptive access, not just first-in-line access. They want the ability to gain immediate access to the network even when lesser priority devices are already actively communicating on the network. Pre-emption means potentially kicking customers off the network or significantly reducing their performance. This is especially critical during times of high network demand, such as large-scale and catastrophic incidents.¹⁵

There are two major public safety concerns with prioritization and pre-emption on commercial carrier networks:

1. While the LTE technical capability for priority and even pre-emption may be available to commercial broadband carriers, the real question is will commercial carriers provide this capability to public safety agencies on the network? “For carriers that live and die based on customer satisfaction, this notion understandably could be a problem, particularly if public-safety roaming occurs on a regular basis and is not as profitable as normal traffic.”¹⁶ “Major carrier executives have publicly stated that they wouldn’t provide public safety with absolute guaranteed access, sometimes referred to as ruthless pre-emption. This is not surprising, because doing so could completely disrupt consumer traffic on the same network during major

¹⁵ Urgent Communications magazine article, “Legality of Public-Safety Roaming at 700 MHz Must be Clarified, by Donnie Jackson, July 8, 2010.

¹⁶ Id.

events or incidents, including the public's calls to 9-1-1."¹⁷ "We have never in our experience been able to convince any of the commercial carriers to give us the kind of prioritization on their networks that we need. It simply hasn't been the case, and we have no expectation that they would do it."¹⁸ Additionally, if carriers would consider providing public safety agencies with prioritization or even pre-emption, they would likely do so at a very high priority queue fee to public safety to help carriers offset their likely increased consumer customer dissatisfaction with slower access, and/or to compensate for loss of consumers to other carriers who undoubtedly will promise to not "kick you off the network" when you most need to call loved ones during incidents or events

2. Public safety command centers require the ability to dynamically prioritize for multiple layers of response. Commanders, whether on-scene or in central command, must be able to make real-time priority assignments based on the individual's function, department and need at that incident. This prioritization can change as the incident changes or additional incidents develop. The diagram below example illustrates the complex number of levels, agencies and responder functions for which public safety command must be able to assign highest to lowest priority. Commercial carriers base priority access on a "by device" priority scheme, meaning that a particular individual's device is always set at the same level of priority. For example, at a major fire scene, a police sergeant likely does not need priority access over a firefighter requiring hazardous materials data and building diagrams before entering a burning warehouse. Yet on a static commercial device ranking scheme, the sergeant's LTE device would always have higher priority. This need to dynamically prioritize multiple layers of response is likely to present significant challenges to commercial carrier networks, from both technical as well as business model

¹⁷ Radio Resource Magazine article, Public Safety Needs the D Block, by Harlin McEwen, Chairman of the Public Safety Spectrum Trust, Dec. 15, 2010

¹⁸ Deputy Chief Chuck, New York City Police Department, at the PERF Conference on Broadband Spectrum, April 15-17, 2010, Philadelphia, PA; as published in Subject of Debate, the PERF Newsletter, Vol. 24. No.3, March 2010..

perspectives, as such ability would require a high degree of control of the spectrum and the commercial network be offered to public safety agencies and customers.

Example of Command Center Priority Table

Geographic Level	Federal	Provincial	City
Agency Level	Police	Fire & EMS	Public Works
Jurisdiction Level	Home		Visiting
Function Level	Fire Responder	Fire	Transportation
	SWAT	Paramedic	Streets & Sanl.
	Vice Squad	Ladder Truck	Parks & Rec
	ATF	Hazardous Materials	Animal Control
	Parking Enforcement	Prevention Specialist	Utilities
Individual Level	Officer	Firefighter	Construction Worker
	Sergeant	EMT	Social Worker
	Captain	Paramedic	Assessment Worker
	Lieutenant	Captain	Supervisor
	Chief	Trainee	Official
Incident Level	3 Alarm	2 Alarm	Civil Disturbance
	Multiple Victims	Gunshot	Traffic Collision
	Traffic Stop	Commercial Alarms	Campus Alarms
Service Level	Video	Email	Voice
	Text Messaging	Location	File Transfer

5-6 (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?

Similar to the issue of priority and pre-emption, the question of building a broadband network that meets public safety’s mission critical requirements is not one of technical capability but whether carriers will elect to build their networks to meet these requirements. Public safety leadership has long expressed their frustration with the reliability, survivability and coverage of commercial networks. Latest experiences were highlighted in public safety’s efforts to get the much need D Block reallocated to them. Among the examples cited are: “When we had Hurricane Wilma a couple of weeks after Katrina, we lost our cell phone traffic after six hours, and our entire broadband mobile

component went down because it relied on a private cellular carrier. The police voice radio network stayed up because it was built to mission-critical standards and it is maintained for our priority.”¹⁹ “We build (our networks) everywhere we operate, not just in the high-density population centers. We don’t know where an emergency is going to be, so we build so we can operate anywhere. Commercial networks don’t do that; they build where they are going to make the most money. They do not provide mission-critical service; they never have.”²⁰ Control of public safety communications is a major issue for public safety officials. This includes a command center’s ability to dynamically prioritize broadband communications per the above Section 5-6 (a).

While there are numerous public safety agencies that are currently using commercial carrier networks, generally for their data communications, they do so knowing that their own mission critical voice networks are the primary lifeline for their first responders. With the emergence of broadband communications, public safety will rely more heavily on such data communications, eventually including voice over IP communications, and therefore will need broadband systems that are more built to its mission critical requirements. As a consequence of the perfectly legitimate commercial drivers cited above, commercial carriers are highly likely not to elect to build or scale their commercial broadband networks to meet these public safety critical requirements. Motorola urges Industry Canada to ensure that Canada’s public safety officials have the future spectrum capacity needed to implement nationwide public safety broadband networks.

5-6 (c) What specific rules, if any, should be mandated by the Department to make such a system viable?

Motorola does not believe Industry Canada should mandate commercial carriers to build broadband networks that provide public safety with the control, priority, coverage, reliability and survivability needed for mission critical applications. Motorola believes that this is a business decision for carriers to address designing and

¹⁹ Id. Major Tom Gross, Miami-Dade, FL Police Department.

²⁰ Id. Chief Chris Moore, San Jose, CA Police Department.

implementing their networks to meet their stakeholder and shareholder expectations of return on investment. Motorola urges Industry Canada to allocate the full 10+10 MHz to public safety, establishing a technical framework to allow a network of networks approach to a national broadband public safety network across Canada. Specifics of this recommendation will be further elaborated in our responses to 5-7 to 5-9 below.

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.

5-8 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.

Motorola notes that public safety and the FCC in the U.S. are envisioning and proceeding toward a wireless broadband network of networks. The FCC has to date conditionally granted 20 waiver requests for public safety entities to deploy shared local, regional or statewide broadband networks. In addition, at least 30 other broadband waiver requests have been filed with the FCC and are pending approval.

At the same time, public safety, broadband industry experts and the FCC are working diligently to ensure that these shared networks will interoperate seamlessly to form a nationwide public safety broadband network. As noted in Section 5-4, the FCC has mandated use of the LTE technology, established ERIC to develop interoperability details, and placed the spectrum under one licensee (the PSST). Together, all of the above will define the needed conditions to ensure that a first responder can roam across the country from one public safety broadband network to the next, and interoperate with any public safety agencies on those networks.

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.

Motorola urges Industry Canada to adopt “Option 3: 10+10 MHz designated for public safety” right from the start. In conjunction with our rationale noted in Section 5-3, there are four primary reasons why we urge the Department to choose this option:

1. Industry Canada must consider the long term broadband requirements of public safety, not only the applications and requirements that agencies have currently identified. If the 700 MHz is auctioned for commercial use, it is forever lost to public safety. If somewhere in the future the Department recognizes that public safety broadband demand has exceeded its allocated capacity, it will mean that an additional, and likely far removed in the upper GHz bands, broadband block will need to be allocated. Use of such non-contiguous bands in a single public safety device will require unique chipsets for public safety. These will likely not be applicable to the millions of commercial broadband devices. Thereby public safety will lose the 700 MHz economies of scale and will ultimately pay a much higher price for their exclusive broadband devices. A price that will be borne by the Canadian taxpayer, the ultimate funder of public safety. “We shouldn’t repeat the mistakes of the past by underestimating the need for public safety system growth and the spectrum needed, which would require subsequent piecemeal allocations be made in other bands.”²¹
2. Studies show that 5+5 MHz (Option 1) designated for public safety will not even meet public safety’s near term requirements. The New York Police Department completed a study that concludes that anticipated demand for advanced wireless services in New York City (NYC) will exceed 10 MHz in just six years.²² NYC projected an amount of broadband spectrum from today over the next 12 years, using

²¹ Radio Resource Magazine article, Public Safety Needs the D Block, by Harlin McEwen, Chairman of the Public Safety Spectrum Trust, Dec. 15, 2010

²² City of New York, 700 MHz Broadband Public Safety Applications and Spectrum Requirements, PS Docket 06-229, filed with FCC Feb. 23, 2010. See website for white paper: http://d-block.net/assets/pdf/NYC_Spectrum_Requirements.pdf. Highlights published in Subject of Debate, the PERF Newsletter, Vol. 24. No.3, March 2010. Also referenced by Stephen E. Zipperstein, Vice President and General Counsel, Verizon Wireless, in June 17, 2010 testimony to Committee on Energy and Commerce, Subcommittee on Communications, Technology and the Internet, U.S. House of Representatives.

models similar to those used by commercial broadband providers adapted with assumptions appropriate for public safety usage. As detailed in Section 5-3, Motorola's modeling of public safety broadband use at three defined levels of response concludes that, even at today's identified demands, an allocation of 5+5 MHz will not meet the minimum broadband capacity needs of public safety.

3. U.S. public safety is increasingly making progress in the U.S. Congress and with the Obama Administration to pass legislation that will direct the FCC to reallocate the critically needed 5+5 MHz D Block spectrum to public safety. The FCC allocated 5+5 MHz (763-768 MHz and 793-798 MHz) to public safety, under a nationwide license to the Public Safety Spectrum Trust (PSST), with the intent of creating a combined public/private broadband network by requiring the D Block (758-563 MHz and 788-793 MHz) winner to build a hybrid nationwide commercial/public safety broadband network that meets public safety requirements and serves both public safety as well as commercial users.²³ That plan fell apart when no commercial carriers successfully bid for the D Block spectrum (no carrier was willing to build such a system), leaving public safety with an insufficient amount of dedicated spectrum to meet their projected capacity requirements.

Because in 1998 Congress originally directed the FCC to auction all 700 MHz, except for the 24 MHz to be allocated to public safety, it now must pass additional legislation to increase that amount by the 10 MHz D Block. The nation's leading public safety associations formed the Public Safety Alliance (PSA). The goal of the PSA is to raise awareness in Congress and the White House about what law enforcement, fire, and emergency medical services need to build out a nationwide, interoperable, 4G, wireless communications network to protect America.²⁴ As of this writing, legislation has been reintroduced in both the U.S. Senate and U.S. House of Representatives for reallocation of the D Block to public safety and funding for the

²³ FCC Second Report and Order, released August 10, 2007

²⁴ See the Public Safety Alliance website www.psafirst.org for details on membership, support, messaging, videos showing public safety broadband applications, and news updates.

build out and operation of a nationwide wireless public safety broadband network.²⁵ In addition, President Obama announced his Administration's support for reallocation of the D Block to public safety and \$10.7 Billion commitment to support the development and deployment of a nationwide wireless public safety broadband network.²⁶ While certainly not a guarantee of successful passage, public safety leadership is increasingly optimistic that they will get critically needed additional 5+5 MHz broadband spectrum and funding to develop and operate that network.

4. LTE technology can interoperate between a 10 MHz channel and a 5 MHz channel.

In the less likely event that U.S. public safety will not succeed in getting the D Block reallocated to them, LTE devices can support interoperability between 10 MHz channel networks and 5 MHz channel networks. LTE base stations broadcast bandwidth information to LTE devices. This allows public safety responders to access each other's networks on either side of the border, regardless of whether the LTE network is the same channel width as the device. This will allow Industry Canada to allocate 10+10 MHz for public safety broadband without awaiting a final resolution of the D Block decision in the U.S.

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 the possible alternatives to address public safety needs?

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

Motorola strongly urges Industry Canada not to adopt the APT band plan. Industry Canada would lose all opportunity to harmonize the 700 MHz public safety band plan with the FCC band plan. This would severely impact Canadian public safety's

²⁵ Sen. Jay Rockefeller, chairman of the Senate Committee on Commerce, Science and Transportation, re-introduced a bill that would reallocate the 700 MHz D block spectrum to public safety, Jan. 25, 2011. The Public Safety Spectrum and Wireless Innovation Act, S.28, also calls for funding of \$5.5B for deployment and up to another \$5.5B for operations/maintenance. Rep. Peter T. King, chairman of the Committee on Homeland Security, joined by ranking member Bennie G. Thompson introduced a similar Bill in the U.S. House of Representatives. The Broadband for First Responders Act, H.R. 607, addressed not only spectrum allocation, but also funding for the construction of a public-safety network and governance.

²⁶ White House Press Release, Feb. 10, 2011.

ability to interoperate with their U.S. counterparts near the border on both mission critical 700 MHz narrowband voice and data systems as well as the public safety broadband systems addressed above. Further, it would eliminate potential economies of scale, limit equipment availability, and increase costs for Canadian public safety. Network and device providers would have to design and manufacture narrowband and broadband solutions that are unique to the Canadian public safety market.

Specifically, the 700 MHz narrowband transmit/receive separation is 30 MHz, as currently defined by Industry Canada in SRSP-511.²⁷ In addition, the base transmit is assigned to the lower frequencies and the mobile transmit is assigned to the upper frequencies. Both are currently harmonized with the FCC requirements. The narrowband systems designed for the 700 MHz public safety market are also (for Motorola and most major manufacturers) capable of 800 MHz operation, allowing agencies to expand their crowded 800 MHz systems.

The APT band plan as noted by Industry Canada has a 55 MHz duplexing separation and the transmit/receive configuration is reversed. This will require each narrowband equipment provider to make a business decision on whether to develop unique narrowband systems exclusively for the much smaller Canadian public safety market. It will also increase the cost of such equipment given the much smaller market size of Canada. The question of public safety broadband equipment availability will depend on what broadband equipment providers eventually develop for the Asia/Pacific commercial broadband market, and whether such equipment will meet public safety requirements.

With the Department's release of SRSP-511 last year and the CRTC's mandate of August 31 of this year for full-power TV broadcasters to clear the 700 MHz band, numerous Canadian public safety agencies started the purchasing process or are in the planning process. These agencies are implementing narrowband systems that are designed to operate on the current Industry Canada and U.S. band plan requirements. Public safety agencies in both countries have waited many years through original and revised 700 MHz narrowband spectrum plans and incumbent TV broadcasters to be

²⁷ SRSP-511, Issue 2, Technical Requirements for Land Mobile Radio Services Operating in the Bands 768-776 MHz and 798-806 MHz, released April 2010.

cleared out of these channels in order to implement 700 MHz and/or expand their existing 800 MHz systems. We therefore urge the Department to stay harmonized with the U.S. 700 MHz public safety band plan.

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.

Motorola commends the CRTC and Industry Canada for their efforts in clearing this 700 MHz public safety band of all incumbent TV broadcasters, both full and low power. While we understand that there are only three LPTV transmitters shown in Industry Canada's broadcasting database for the current public safety band (764-776 MHz and 794-806 MHz) and that these are in rural areas of British Columbia, we urge the Department to consider accelerating the notification and clearing process as follows:

1. Initiate and mediate discussions between public safety and the three identified LPTV incumbents in the current public safety band, as soon as possible in order to have them vacate this spectrum as early as possible after August 31, 2011.
2. Notify LPTV transmitters in the 700 MHz public safety broadband spectrum (as defined by Industry Canada decision) plus LPTV transmitters in the TV channels adjacent to public safety spectrum to clear this spectrum within six months of the displacement notification.

Public safety communications are not restricted to urban areas or along highway corridors. First responders must be able communicate in their jurisdictional area, wherever the incident scene is located, and in locations where they are providing mutual

aid to other agencies. Emergencies often happen in rural and remote areas. Public safety narrowband networks are also not infrastructure dependent and can be operated radio to radio anywhere. Public safety operation of both narrowband and broadband networks without interference is dependent on clearing incumbent LPTV operators from not only the co-channel but also the adjacent 6 MHz TV channel. Therefore, adjacent channel spectrum needs to be vacated on the same timetable as the public safety spectrum. In all of the above instances, we encourage the implementation of a single timeline, rather than a staggered timeline depending on LPTV transmitter location, and that this timeline be universally shortened to one half year.

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.

Motorola reiterates its support of Industry Canada's timetable of clearing low-power devices out of the current 700 MHz public safety band by March 31 of this year. We also reiterate our concern that RABC believes it is likely that the majority of low-power radio devices operating in the 700 MHz band are unlicensed. We again urge the Department to develop and implement an information campaign that informs users, dealers, and manufacturers of wireless microphones and other low-power communications devices of these operating deadlines.²⁸ Motorola supports the March 31, 2012 deadline for low-power devices operating in all other 700 MHz spectrum. Even though this date will then apply to the 700 MHz public safety broadband spectrum, we believe it will provide sufficient implementation time for public safety broadband networks from the point of Industry Canada's release of applicable broadband rules.

CONCLUSION

Motorola commends Industry Canada on the inclusion of public safety broadband spectrum requirements within the Department's 700 MHz Band Consultation. As detailed in our Comments, we stress the need for the Department to harmonize the 700

²⁸ Motorola Comments, dated Nov. 12, 2009, to Canada Gazette Notice No. DGTP-011-09, Consultation Paper on Low-Power Licensed Radiocommunications Devices, Including Wireless Microphones, in the Band 698-806 MHz, Sept. 2, 2009.

MHz band plan and technical rules with that of the FCC. This will promote broadband interoperability among public safety agencies within Canada as well as cross border with U.S. agencies, and increase economies of scale and equipment availability. We urge Industry Canada to recognize public safety's needs for contiguous broadband spectrum over the long term by allocating the full 10+10 MHz broadband block to public safety. Motorola encourages the Department to act expeditiously in this allocation and in developing additional Consultations to define the detailed rules needed by public safety to start planning and implementing a nationwide broadband network of networks that meets their mission critical requirements.

Respectfully Submitted,

A handwritten signature in blue ink that reads "George Krausz". The signature is written in a cursive, flowing style.

George Krausz
President and Country Manager
Motorola Canada Limited