March 21, 2012

The Chairman
Telecom Regulatory Authority of India
New Delhi

Subject: Motorola Solutions Response to TRAI Consultation Paper on Auction of Spectrum (Consultation Paper No. 04/2012).

Dear Sir,

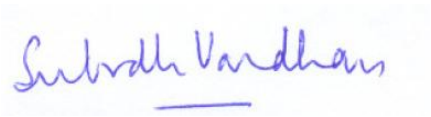
Enclosed please find our response to the Telecom Regulatory Authority of India Consultation Paper on Auction of Spectrum dated March 7, 2012.

Our response is not specific to any particular question but is a unified response addressing the general issue of 700 MHz band.

We have also attached with our response some documents from the recent US Congress legislation on 700 MHz that impacts this issue.

We would be happy to provide any further information that you may need on this subject. Please feel free to contact the undersigned in case of any questions or clarifications.

Thanking you and with best regards.



Subodh Vardhan
Managing Director

Encl:

Annex 1: Motorola Solutions India Response to TRAI consultation on Spectrum Auctions.

Annex 2: Congress passes D Block legislation: News article from US on allocation for PPDR in 700 MHz spectrum

Annex 3: News articles from Canada on 700 MHz and PPDR

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## Annex 1

**Motorola Solutions India Response to TRAI Consultation on Spectrum Auctions.**

The radio frequency spectrum is a limited natural resource of great significance to the nation and therefore it is essential that these resources are used rationally, efficiently and economically so that equitable access is available for all spectrum users of different Radio communication services. With the emergence of new technologies and with astounding growth of telecommunication services all over the world, spectrum management process has become extremely complex and intricate. It is necessary that all the spectrum, whether government or private, work in the spirit of mutual understanding and cooperation and utilize these resources in most optimal manner with self-discipline. Under the ITU-R radio regulations, radio frequency spectrum is allocated to various radio services. These include inter alia fixed, mobile, broadcasting, satellite, radio astronomy etc. In the recent past the growth of telecommunications services particularly mobile telephony, has been phenomenal and due to this growth in telecom, the number of subscriber have reached a record number. As the mobile services require spectrum, sufficient spectrum is required to be made available for successful implementation of wireless based telecom infrastructure. At the same time requirement of spectrum for government users, particularly for Public safety, radio navigation and defense services has also increased manifold.

Spectrum auctions therefore need to balance the needs of commercial entities and the public interest of services such as public safety, defense etc. One of the critical objectives in deciding the spectrum auctions should be to balance the needs of commercial operators and the government's own need of spectrum for protecting lives.

Spectrum is critical in the operation of any modern public safety organization. The Public Safety organization's mission is the prevention of, and the protection against, man-made or natural events that can endanger the public from significant danger, injury or harm, or damage. The police organization is one of three primary public safety organizations that respond to any events that can hurt you and your family. The other two PPDR (Public Protection and Disaster Recovery) organizations are the fire service, and the ambulance or emergency medical service. Their primary responsibility is to respond to any emergencies that occur on a daily basis and to aid in the recovery efforts once the disaster has been contained or has passed. Many other organizations may also exist in the country to help them during times of disasters, such as the water and electricity utilities, the local hospitals, airports, and traffic enforcement departments. The value of public safety to society usually goes un-noticed by the general public, and it is also very hard to quantify the exact benefit of public safety in monetary terms because they are not a profit-making business. They are a government department, and as such, have budgetary constraints and legal requirements to fulfill. However, it's easy to understand the impact of the absence of public safety. If they are unable to perform their duties, anarchy will prevail and everyone in society will feel the effect.

When we have effective public safety, law & order prevails. When law & order is maintained, everyone in society can move about freely, to conduct business, or to go to

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school, or to enjoy a walk in the park. More importantly, businesses can operate without fear, allowing them to invest their money into new businesses or to just simply trade. When this happens, economic activity happens. When economic activity happens, there is growth and wealth gets shared and spread among everyone. Businesses pay taxes and buy things, which give government workers jobs. When taxes are paid, government has money to build a stronger society. Government politicians and administrators will choose to invest in a variety of investments that help the overall society to function well, such as education, transportation infrastructure, social services to the poor & needy, and of course, public safety.

The converse is also true: When there is no public safety, there is no one around to fight crime, or put out the fires, or save our life when one has a heart attack. People die needlessly when government doesn't or cannot invest in public safety. When that happens, crime increases, and corruption begins to permeate into society. When this happens, businesses and investors leave that society for less riskier areas. This results in economic depression and poverty for that area.

For any society to maintain peace, stability, safety, and order, there must be a functioning government with police to maintain law & order, and public safety to respond to emergencies and disasters.

All of the public safety organizations are very similar in operations across the world. They all face the same constraints and challenges, such as not having enough police officers, firemen, and paramedics as they would all like to have. They also are never given enough money to do what they need to do. Because of low budgets, many public safety organizations must use old and limited technologies to do their jobs in fighting crime and saving lives. They have a very large geographical area that they must cover, usually the entire country. Their jobs are hazardous, even life-threatening to their officers, yet the public expects this from them. When they put their uniform on every day in the morning to go to work, they might not come home that night or ever.

Unfortunately, some criminals have better funding from their criminal activities than they do and are able to get better technology than them, so they have become more sophisticated. More recently, as we have all seen in the news and witnessed, the natural disasters are reaching to higher levels of destruction than ever before. The higher levels of destruction require public safety to respond faster than ever before and require them to be more effective if they are to save lives. It also requires all of them to start working together more than ever before, across borders. An earthquake or typhoon does not distinguish between countries, and doesn't know borders. It just knows how to destroy everything and kill everyone. If they are to save lives and minimize damage, they need more cost-effective technologies that are interoperable across borders so that they can help each other in times of need.

Our public safety organizations, their officers put their lives in the line of duty to protect and serve the public every day. Even during a disaster, public safety officers must still come to work while our families are at home they are helping people in the disaster.

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That's what they are paid to do, and that's what they have sworn to do for the public good and for society.

Spectrum is critical for Public Safety needs. Simply put, if they have no spectrum, or not enough frequencies allocated to them to do their job, they have no effective PPDR response. No spectrum = No effective PPDR response! It's just that simple! PPDR organizations depend on spectrum as a critical tool and to do their jobs effectively for the public. Indeed, they depend on spectrum to save their own lives at times. When a police officer or fireman is in danger, their radios are the only way that they can call for immediate help. For police officers, firemen, and paramedics to respond to the emergency situation, they need fast and coordinated response. They all know how fragile a human life is. When a person is severely injured, every second counts in saving that person's life. For all public safety organizations to do their jobs effectively across a large geographical area with expediency, wireless technologies are the only practical means to do this. They use a variety of wireless technologies to communicate, such as microwave, satellite, aviation and marine radios, cellular, and land mobile two-way radio. For their daily work, two-way radios are the preferred technology of choice because of its ability to get inside buildings deeply, its speed of call setup, and its performance of group calling many officers at one time. During a disaster, everything that is wireless is used, but two-way radio is the most effective and most heavily used tool in the disaster area. During a disaster, they can never have too much wireless technology.

Wireless technology has advanced to a whole new level for PPDR. The new 700 MHz digital dividend gives public safety organizations now a new tool to aid in emergency response and disaster management. The new 700 MHz digital dividend enables public safety to finally get what they've needed for decades – mobile broadband to enable full-motion video from the field. Many of the public safety organizations around the world are looking at standardizing on LTE as the next technology for their use in combating crime and saving lives. In order for them to do their jobs effectively, public safety organizations will require dedicated broadband spectrum that will guarantee them uninterrupted video from the disaster site, and they'll need a minimum of 10+10 MHz, and ideally 20+20 MHz to guarantee video quality that conveys the level of information that they need to make proper life & death decisions. European public safety organizations have done a lot of research in this area and have determined that a 10+10 MHz of dedicated spectrum is barely adequate. Studies done by a German consultant have concluded that a 15 MHz uplink and a 10 MHz downlink are required for public safety.

Public safety has needed mobile video for many years to be able to do some of these types of applications for command decision-making:

- When they are in a high-speed car pursuit of a suspect, they need to know if they need to call off the pursuit because of the amount of people or innocent bystanders in the chase area.
- They need multiple camera angles on hostage situations or during a bank robbery.
- They need to know what the health of their firemen is when they enter a burning building to save someone's life, or while they are fighting a bushfire.

- They need to see what the SWAT officers see as they start a rescue operation.
- They need to be able to use robots with video cameras in caved-in areas to search for trapped survivors after an earthquake.

These are only some of the possible immediate uses today, and they expect many more as they gain experience with this new and exciting technology. Both narrowband and the new mobile broadband technologies are required for all public safety organizations to do their jobs effectively in their business of saving lives, fighting crime, and helping society. These are a few suggestions that can help them to improve their PPDR response to their respective societies.

With an always-on public-safety broadband network connecting a multimedia command center to these new devices, first responders will be armed with powerful tools to meet new threats on the street. LTE handhelds will feature robust and secure data, mission-critical applications and rich multimedia content. IT staff will rely on tools that help deploy, track, monitor and manage devices in the field; they'll even be able to lock and wipe a device that is lost or stolen. Rugged, reliable and designed as a true mission-critical public-safety device, LTE handhelds will offer enhanced durability, a streamlined user interface and support a wealth of tactical applications.

Just as the public now has access to more-sophisticated communications tools, so do criminals. Today, criminals have worldwide wireless communications, instant access to social networks and online tools that let them anonymously coordinate crimes ranging from international weapons smuggling to flash-mob attacks. To deal with these increasingly complex threats, police officers need new, more-capable crime-fighting tools that provide powerful situational awareness and better protection of citizens and property.

Accomplishing this is easier when you eliminate the element of surprise. LTE devices will help do that, and more, by allowing officers to receive urgent updates and quickly access video feeds and tactical applications. So when an incident occurs, officers can pan and zoom video cameras to capture faces for evidence. Even if the suspects attempt to escape, the entire sequence of events has been recorded, with details, locations and response tactics shared instantly across responding officers and agencies to facilitate quick arrests. Purpose-built, public-safety LTE devices are already becoming available in the market at an accelerated pace. And agencies will continue to carefully evaluate how to add to existing capabilities wisely and cost-effectively. Leading the way will be those solutions that leverage standards-based components, deliver an improved user experience, include an ecosystem that supports innovative public-safety applications and improve interoperability between agencies.

***Therefore while auctioning the 700 MHz spectrum, at least 10+10 MHz be reserved for use of government agencies. This is in line with the global initiatives and the decisions of ITU and APT.***

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## Annex 2

**Congress passes D Block legislation**

In arguably one of the most significant events in U.S. public-safety communications history, both houses of Congress today passed payroll-tax legislation to reallocate 700 MHz D Block spectrum to first responders and provide $7 billion in federal grant money for the deployment of a dedicated nationwide LTE network.

"This is going to transform public-safety communications the same way that two-way radio did in the 1930s," said Charles Dowd, deputy chief for the New York City Police Department. "That's how big of a change this is going to be."

The US House of Representatives voted 293-132 in favor of the measure, followed shortly by a 60-36 vote in the Senate to approve the bill, which was the product of House-Senate conference committee negotiations during the last two months. President Barack Obama has vowed to sign the legislation into law shortly after returning from a West Coast trip.

While the focal point of the legislation is to extend the payroll-tax cut and unemployment benefits, the measure includes spectrum-policy language designed to make more airwaves available to commercial wireless operator via FCC auctions — a significant revenue source for the bill — and to address public-safety broadband needs.

With the reallocation of the D Block — the 10 MHz swath of spectrum adjacent to the airwaves licensed to the PSST — first responders will have 20 MHz of contiguous spectrum on which to deploy the proposed LTE network. The buildout of the network will be funded largely by the $7 billion in federal grants that the legislation dedicates for the task, $2 billion of which will be available before any auction proceeds are realized.

Many industry observers question whether $7 billion will be enough money to pay for public-safety LTE deployment throughout the nation, particularly in rural areas. Sen. Jay Rockefeller (D-W.Va.) had proposed legislation that would have allocated $11 billion for the network buildout, but he expressed confidence that the funding in the legislation will have a significant impact in the future.

"When you put $7 billion into a buildout of something of this nature, the public — if not the whole country — instantly and absolutely understands what is going on, so you can't stop it," Rockefeller said yesterday during a webcasted conference. "The point was to start it to the extent that you couldn't stop it. And we did that."

Although first responders will gain the D Block spectrum, the bill calls for public safety to return spectrum in the T-Band (470-512 MHz), which is used to support narrowband voice system in 14 of the largest metropolitan areas. Under the terms of the bill, this spectrum would have to be returned to the federal government in 9 to 11 years, and the federal government would cover costs to relocate public-safety systems. However, public safety will

be allowed to keep its 700 MHz narrowband spectrum, where first-responder agencies have invested more than $2 billion in recent years to deploy LMR systems.

Other funding in the legislation includes $250 million for next-generation 911 deployments, $100 million for the FirstNet administration and as much as $300 million for research and development of public-safety broadband technology.

Currently, the Public Safety Spectrum Trust (PSST) holds the license to public safety's 10 MHz of broadband spectrum in the 700 MHz band. Under the legislation, the license to that swath and the D Block will be held by the First Responder Network Authority, or FirstNet — an independent authority within the National Telecommunications and Information Administration (NTIA) that will have a board that includes significant public-safety representation.

**Annex 3**

**Backgrounder**

**Harper Government Takes Action to Support Canadian Families**

**Rules for the 700 MHz and 2500 MHz Spectrum Auctions**

**Foreign Investment Restrictions in the Telecommunications Sector**

The Harper Government is introducing several measures with the objectives of sustaining competition and robust investment in wireless telecommunications and of promoting the timely availability of advanced services for all Canadians, including those in rural areas.

- Foreign investment restrictions will be lifted for companies that have less than a 10-percent share of the telecommunications market, promoting competition by improving new wireless entrants' access to capital.
- Caps in upcoming spectrum auctions will effectively ensure that new wireless entrants and regional providers have access to prime spectrum.
- Tower sharing and roaming policies will be improved and extended.
- Obligations will be imposed on 700 MHz spectrum licence holders to see advanced wireless services quickly delivered to rural Canadians.

**1. Policy objectives**

The Harper Government is committed to ensuring the timely availability of world-class wireless services at low prices for Canadian families, including those in rural areas.

Wireless telecommunications, and the radio frequency spectrum that enables it, are fundamental to world-class digital infrastructure, a key pillar of Canada's digital economy.

In developing the measures announced today, the Harper Government was guided by three objectives:

1. Sustained competition in wireless telecommunications services;
2. Robust investment and innovation in this sector; and
3. Availability of advanced services for all Canadians, including those in rural areas, in a timely manner.

Decisions have also been guided by the broad principle of reliance on market forces to the maximum extent possible.

## 2. Context

### What is spectrum and what is up for auction?

Spectrum is necessary for wireless communication. It is a finite public resource managed by the government and made available through the issuance of licences. It is divided into frequency bands and allocated to services such as broadcasting, satellite and mobile services.

The Harper Government is making additional spectrum available for mobile services to help meet the rapidly growing demand for high-speed wireless services. This includes the 700 MHz spectrum band, which the government has designated for mobile services following the transition of analog over-the-air television broadcasting signals to digital signals. This is only the second time such low-frequency spectrum, especially desirable due to its ability to propagate over long distances and penetrate buildings, has been made available for commercial wireless use. The government will also be auctioning 2500 MHz spectrum, which will further enable service providers to meet the rapidly growing demand for data by consumers and businesses.

This spectrum will allow telecom companies to bring the latest 4G LTE mobile networks to Canadian consumers and businesses, including those in rural areas. This means Canadians will have access to the fastest mobile speeds and latest devices, such as the newest iPad, PlayBook and smartphones. They will have access to high-definition video and video conferencing over mobile networks. Canadians will benefit from greater access to e-health, intelligent transport and other advanced applications. This will result in improved connectivity for consumers, increased business productivity and enhanced safety for Canadians.

### Developments since 2008

The Canadian wireless landscape has changed significantly since the 2008 auctioning of Advanced Wireless Services spectrum. At that time, the government set aside spectrum for new entrants and implemented other policies to support new competitors. New entrants have since made large investments to launch services and are providing greater choice to Canadian consumers. These new entrants currently serve over 1 million Canadians. At the same time, Canadian incumbent wireless providers continued to invest in their networks. Over 98 percent of Canadians now have access to high-speed wireless services. Average Canadian mobile wireless prices have fallen by more than 10 percent since 2008.[1]

This same time period has also seen an explosive growth in demand for high-speed mobile services. Globally, the use of smartphones, tablets and other data-intensive devices has resulted in mobile data use that has tripled each year since 2008.[2] In Canada, 8 million

[1] Price comparison study conducted for the CRTC in April 2011 by Wall Communications Inc. and is based on an average of three monthly usage baskets in Halifax, Montréal, Toronto, Regina and Vancouver.
[2] Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update 2010–2015.

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Canadians already own a smartphone, and that number is growing rapidly. This growth is putting unprecedented demands on mobile networks.

**Consultations and considerations**

In developing its policies, the government considered the stakeholder views provided during multiple public consultations. These include consultations on both the 700 MHz and the 2500 MHz spectrum auctions and on options for the reform of foreign investment restrictions. In consultations, respondents expressed a range of views. For example, all stakeholders agreed on the importance of spectrum to meet growing demand and improve services. However, views diverged on whether government action was necessary to continue to promote competition. Most incumbent wireless providers argued that no special auction measures and no changes to foreign investment restrictions were required. These companies expressed a need for additional spectrum in order to meet rapidly increasing demand for data and to deploy next-generation services to rural areas. New wireless entrants cited their limited access to spectrum and called for rules that reserved spectrum for them in upcoming auctions. These companies highlighted the fact that incumbents control about 85 percent of mobile spectrum holdings and all of the low-frequency spectrum. New entrants also pointed to limits on their ability to attract capital, and many called for relaxation of Canada's foreign investment restrictions in the telecommunications sector.

Many governments are supporting competition in mobile telecommunications services through auction rules and other requirements. For example, France, Germany, Italy and the U.K. have adopted spectrum auction caps, which limit the amount of spectrum that a company can acquire. These countries also require spectrum holders to deploy to rural areas within a certain time frame.

**3. Summary of decisions**

**Reform of foreign investment restrictions under the *Telecommunications Act***

The government will amend the *Telecommunications Act* to exempt telecommunications companies with less than 10 percent of total telecommunications Canadian market revenue from foreign investment restrictions in that Act. This change will promote competition by improving access to capital. In order to encourage long-term investment in Canada's telecommunications industry, companies that are successful in growing their market shares in excess of 10 percent of total Canadian telecommunications market revenues other than by way of merger or acquisitions will continue to be exempt from the restrictions. Restrictions on foreign ownership under the *Broadcasting Act* would remain for all companies with broadcasting distribution activities. As is the case with any direct foreign investment, the provisions of the *Investment Canada Act* will continue to apply.

**Spectrum caps in upcoming 700 MHz and 2500 MHz auctions**

The government will apply caps in the upcoming spectrum auctions that will enable four or more service providers in each region to obtain spectrum in both the 700 MHz and the

2500 MHz bands. In the case of the 700 MHz spectrum, a limit on prime spectrum will be imposed on incumbents, which, like a set-aside, will effectively reserve prime spectrum for new entrants and regional providers. Unlike a set-aside, the measures will not require Industry Canada to identify specific blocks of spectrum, allowing companies to bid according to their business plans.

We plan to hold the 700 MHz auction in the first half of 2013, to be followed by the 2500 MHz auction within a year.

It is the government's expectation that companies will begin rolling out network coverage—and delivering benefits to Canadians—in a timely fashion after acquiring this new spectrum.

**Spectrum licence obligations**

***Rural services***

The government will require companies having access to two or more blocks of paired spectrum in the 700 MHz band, through auction licences or through spectrum sharing, to cover 90 percent of the population of their current high-speed population coverage within five years and 97 percent within seven years of licensing. The obligations imposed on spectrum licensees are to support the deployment of next-generation services to rural Canadians in a timely fashion. In addition, general rollout requirements will be applied to both the 700 and the 2500 MHz bands, as in previous auctions, requiring between 20- and 50-percent population coverage, depending on the region, within 10 years.

***Roaming policies***

Roaming allows subscribers to use services from another service provider when travelling outside of the coverage of their service provider's network. In 2008, as part of the government's policies to encourage new competition in the wireless sector, Industry Canada required all carriers to offer roaming, including some provisions that were only available to new entrant service providers. These requirements were put in place for five years and will begin to expire in 2013. In order to support competition and continued access to roaming for customers of new entrants, Industry Canada intends to improve and extend these roaming policies through the following:

- extending roaming provisions indefinitely and expanding them to all carriers; and
- shortening the timelines for initiation of arbitration and the arbitration process between companies negotiating roaming agreements.

***Antenna tower sharing***

In 2008, Industry Canada also mandated antenna tower and site sharing. This policy was introduced to reduce the proliferation of antenna towers and to facilitate the entry of new

competition into the wireless market. In order to further advance these objectives, Industry Canada is proposing changes to improve the current tower sharing policies including:

- requiring carriers to make available basic information on all towers to improve transparency and expedite the sharing process; and
- shortening the timelines for initiation of arbitration and the arbitration process.

Stakeholder input will be sought on the proposed changes to roaming and tower sharing policies.

**Designating spectrum for public safety**

The public safety community has an increasing need for access to mobile broadband applications and has unique requirements for reliable coverage, including in underground areas and within buildings. The Government of Canada is designating spectrum in the 700 MHz band for public safety broadband use. This follows a similar designation in the U.S. and will allow for cross-border interoperability between public safety agencies. Industry Canada also consulted on the possible designation of an additional block for public safety broadband use. A decision on this block will be made following a review of the recent U.S. decision on the matter and further consultation.

**4. Conclusion**

Canadians have recently benefitted from greater competition, low prices and increased choice in wireless telecommunications services. This has been the result of factors including measures introduced by the government in 2008 to support the entry of new competitors. The measures announced today build on these actions, supporting competition and robust investment in the sector and the availability of advanced wireless services in rural areas.

**Below are links to relevant documents:**

Policy and Technical Framework: Mobile Broadband Services (MBS) – 700 MHz, Broadband Radio Service (BRS) – 2500 MHz Band

http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10121.html

Proposed Revisions to the Frameworks for Mandatory Roaming and Antenna Tower and Site Sharing

http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10250.html

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