

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In re)
)
Public Safety and Homeland Security)
Bureau Seeks Comment on the Technical)
and Operational Feasibility of Enabling) PS Docket No. 06-229
Flexible Use of the 700 MHz Public Safety)
Narrowband Allocation and Guard Band)
for Broadband Services)

COMMENTS OF MOTOROLA, INC.

Barry Lambergman
Director, Government Affairs
Motorola, Inc.
1455 Pennsylvania Avenue, NW
Washington, DC 20004
TEL: 202.371.6900

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Motorola, Inc. (“Motorola”) submits these comments in response to the Public Notice released by the Federal Communications Commission’s (“Commission”) Public Safety and Homeland Security Bureau (“Bureau”) that seeks comments on whether to allow public safety agencies to use the 700 MHz narrowband public safety spectrum for broadband services.¹ As further detailed below, any effort to repurpose the 700 MHz narrowband allotment for broadband technologies – even on a voluntary, flexible use basis – will have a profound impact on public safety mission critical voice communications capabilities and will undermine interoperability for both narrowband and broadband operations. At this time, Motorola does not believe that the likely benefits of such an action would outweigh the potential risks.

I. Introduction and Summary.

The 700 MHz public safety allocation spans 24 MHz at 763-775/793-805 MHz. The band provides spectrum for both narrowband and broadband technologies. The channel allotments for these two types of technologies are segregated in order to minimize inter-system

¹ Public Safety and Homeland Security Bureau Seeks Comment on the Technical and Operational Feasibility of Enabling Flexible Use of the 700 MHz Public Safety Narrowband Allocation and Guard Band for Broadband Services, Public Notice, PS Docket No. 06-229, DA 10-1877 (Sept. 28, 2010) (“*Public Notice*”).

interference. The narrowband allotment occupies 769-775/799-805 MHz while broadband technologies are confined to 763-768/793-798 MHz. There are two one megahertz guard bands (768-769/798-799 MHz) separating these two allotments.

In an effort to identify additional spectrum for public safety broadband services, the *Public Notice* seeks information that will help it develop recommendations on whether the Commission should allow public safety users the option of using 700 MHz narrowband spectrum for broadband services. More specifically, the Bureau presents a number of questions to determine whether such flexibility would be operationally feasible and technically compatible with existing and future public safety narrowband operations and, to that end, seeks comment on potential conditions or restrictions on flexible use that might be required to prevent harmful interference to narrowband operations or impairment of narrowband interoperability.

Motorola believes that it is critically important for this country to solve both the spectrum and funding issues that stand in the way of providing public safety with state-of-the-art broadband data and video services that will improve their ability to protect the public. But this goal should not be achieved at the expense of mission critical narrowband voice services. Unlike members of the general public,² public safety users are far less likely to substitute text and emails for voice communications when responding to emergency situations. It is incumbent upon the

² The Commission has observed a significant shift in commercial user traffic from voice services to data services. *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993 Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Services*, Fourteenth Report, WT Docket No. 09-66, 25 FCC Rcd 11407, ¶ 176 (2010) (explaining that the “trend of declining voice minutes may be due to substitution by mobile messaging services”). While Motorola expects that public safety’s use of broadband data and video services will explode once applications tailored to their needs become more widespread, such services are more likely to augment rather than replace the need for voice.

Commission to provide public safety with the spectrum it needs to address all types of communications services, both narrowband and broadband in nature.

Motorola typically supports flexible regulatory policies that allow licensees to use spectrum in the manner that best suits their needs. In addition, Motorola is extremely excited about the capabilities that broadband services will provide public safety users and is now working with many customers to design and implement broadband networks that are suitable for mission critical applications. Motorola's commitment and ingenuity in designing public safety broadband networks was recognized this year by the National Telecommunications and Information Administration ("NTIA") which awarded Motorola more than \$50 million in grant money in support of a public-private partnership that will enable the deployment of a 700 MHz interoperable wireless public safety broadband network and a public access wireless broadband network in the greater San Francisco Bay Area.³ Motorola is committed to working with all interested parties, including Congress and the Commission, to ensure that public safety agencies do not become second class broadband citizens.

Allowing public safety to deploy broadband technologies on the narrowband allotment, however, undermines an equally important public policy goal of ensuring nationwide interoperability for mission critical voice services. And, by reducing the spectrum available for narrowband applications, this action would perpetuate this country's historical failure to provide adequate spectrum capacity to meet public safety's existing and near-term needs and would set the stage, once again, for a future allocation in another frequency band that would need to be

³ Press Release, The White House, Vice President Biden Announces Recovery Act Investments in Broadband Projects to Bring Jobs, Economic Opportunity to Communities Nationwide (Aug. 18, 2010), <http://www.whitehouse.gov/the-press-office/2010/08/18/vice-president-biden-announces-recovery-act-investments-broadband-projec>; http://www.whitehouse.gov/sites/default/files/microsites/20100818_Broadband_Awards.pdf.

integrated into public safety’s long menu of spectrum options. This approach continues to impose costs on the development and manufacture of public safety equipment.

The 700 MHz narrowband public safety allocation was predicated on a demonstrated need for additional spectrum for mission critical voice services – an application that cannot be provided using today’s broadband technologies. The development of broadband technologies over the past decade has not diminished this need by even a single hertz. As an illustrative example, it is worth noting that despite the marked progress in funding and deploying a public safety broadband network, the Bay Area Regional Interoperable Communications System (BayRICS) continues to secure funding to support the deployment of complimentary 700 MHz narrowband networks.⁴ In the future, broadband technologies may be able to provide mission critical voice services but the necessary standards work – let alone product development, testing and deployment – remains several years ahead. In addition, a number of the narrowband system sites will be leveraged for broadband. From an operational standpoint, narrowband and broadband deployment is complementary, but a spectrum policy to allow broadband in the narrowband spectrum would artificially make them mutually exclusive with one another.

Since the 700 MHz allocation was made, public safety agencies have dedicated hundreds of millions of dollars and devoted an incalculable number of man-hours to plan and deploy such interoperable networks to improve both communications operability and interoperability. Allowing for *ad hoc* repurposing of the narrowband allotment would undercut that progress and impose significant new burdens on the regional planning committees (“RPCs”) to amend existing plans to account for possible broadband deployment on the narrowband channels.

⁴ A description of the BayRICS “network of networks” is available on the Bay Area UASI web site *available at* <http://www.bayareauasi.org/groups/bayrics/default.aspx>.

The existing 700 MHz narrowband allotment barely provides sufficient capacity to enable nationwide interoperable voice services that could meet public safety needs for the overwhelming majority of incidents that require multi-agency response. Allowing some agencies in some regions the opportunity to use these frequencies for broadband will at minimum undermine, if not eliminate, this opportunity for contiguous, nationwide interoperability. Proceeding down this path because of projections that broadband technologies may offer the long term potential to support mission critical voice applications in the future would be reckless and jeopardize emergency response capabilities.

In addition, co-mingling broadband and narrowband technologies that are deployed with different network architectures in the same band will not maximize the efficient use of the spectrum as protection standards must be designed to protect technologies with different tolerances to interference. In this instance, spectrum guard bands would need to be maintained, as is recognized in the existing 700 MHz band plan.⁵ In addition, geographic separations will need to be implemented between co-channel broadband and narrowband systems. As discussed further below, this will result in “exclusion zones” where the spectrum being used for broadband cannot be reused for narrowband services for at least 1 to 5 miles from the service border of the broadband network.⁶ If a major metropolitan area decides to use the narrowband spectrum for

⁵ See 47 C.F.R. § 90.531(f). See also *Implementing a Nationwide, Broadband, Interoperable Public Safety Network in the 700 MHz Band; Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communications Requirements Through the Year 2010*, Second Report and Order, PS Docket No. 06-229, WT Docket No. 96-86, 22 FCC Rcd 15289, ¶ 348 (2007) (“*Second Report and Order*”) (establishing the current guard bands “as a buffer between the surrounding public safety broadband and narrowband operations”).

⁶ As further explained in Section II of these comments, this estimate of the size of the required exclusion zone between narrowband and broadband systems assumes that higher powered narrowband subscriber units need to be separated from broadband base receivers by a distance approximately equal to 1.66 times the radius of the broadband cell. For 1 kilometer cell

broadband services and the neighboring jurisdictions do not participate in the network, the necessary exclusion zones could potentially cover hundreds of square miles of suburban locations covering significant population densities that public safety must serve. This will greatly reduce the overall utility of the 700 MHz allocation for both narrowband and broadband public safety use.

Below, Motorola expands on these views by addressing thematically the questions raised in the Bureau's Notice. Motorola looks forward to continuing this dialog with the Bureau and the Commission to help ensure that public safety has the best communications services possible.

II. Flexible Use of 700 MHz Narrowband Spectrum for Public Safety Broadband Would Irrevocably Set Back Public Safety Interoperability.

In the *Notice*, The Bureau asks “what impact would allowing flexible use of . . . narrowband spectrum have on the continued ability to support nationwide narrowband interoperability?”⁷ As detailed below, the impact would be harmful for narrowband interoperability, and could potentially foreclose the possibility of nationwide narrowband interoperability altogether.

Public safety and emergency responders have long strived to achieve ubiquitous interoperability for voice communications. While incompatible technologies and a lack of operational protocols have played a significant role over the years to frustrate the goal of nationwide interoperability, a major factor has also been the inadequate spectrum allocations intended to meet public safety's short-term needs. Over the years, public safety has received

radius, the required exclusion zone would be approximately 1.66 kilometers (approximately 1 mile) wide. For 5 kilometer cell radius, the required exclusion zone would be 8 kilometers (approximately 5 miles) wide.

⁷ *Notice* at 3.

insufficient amounts of spectrum in each of the major allocations (*e.g.*, the 30-50 MHz, 138-144/148-174 MHz, 450-470 MHz, 470-512 MHz, and 806-824/851-869 MHz bands) which failed to account sufficiently for future growth and the expanding requirements for public safety communications.⁸ These past allocation decisions have hampered interoperability as public safety agencies were forced to operate in various bands and technology was not capable of seamlessly bridging the operational differences.

The 700 MHz allocation was intended to help remedy the impact of these past decisions. In 1996, the Public Safety Wireless Advisory Committee (“PSWAC”) issued a report finding that the spectrum then allocated to public safety did not provide adequate capacity for obtaining interoperability and recommended use of the 700 MHz band for this purpose.⁹ Subsequently, in the Balanced Budget Act of 1997, Congress mandated that the Commission establish terms and conditions to govern use of the 24 MHz of spectrum that had recently been reallocated from broadcast to public safety services.¹⁰ In response, the Commission allocated 12 MHz of 700 MHz spectrum for narrowband operations in 1998.¹¹ In making this decision, the Commission noted that “[i]nteroperability signifies the crowning achievement of this proceeding” as “the

⁸ Letter from Andrew Seybold to Marlene H. Dortch, FCC, at 15 (filed Sept. 10, 2010) (“[The interoperability issue for voice communications has been created over a thirty-year period by previous FCCs that instead of finding sufficient contiguous spectrum for Public Safety’s voice needs, continued to provide small slices of spectrum in an assortment of frequency bands.”).

⁹ Public Safety Wireless Advisory Committee, Final Report of the Public Safety Wireless Advisory Committee to the Federal Communications Commission and the National Telecommunications and Information Administration at 21 (Sept. 11, 1996).

¹⁰ Balanced Budget Act of 1997, Pub. L. No. 105-33, 111 Stat. 251 (1997).

¹¹ See *The Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communication Requirements Through the Year 2010; Establishment of Rules and Requirements for Priority Access Service*, First Report and Order and Third Notice of Proposed Rulemaking, 14 FCC Rcd 152, at ¶ 2 (1998).

inability of public safety agencies to efficiently communicate with one another is a glaring deficiency in present day public safety communications.”¹² In 2001, the Commission adopted Project 25 (“P25”) as the single interoperability standards for public safety operations in the 700 MHz narrowband allocation.¹³ As Motorola has detailed elsewhere, the P25 interoperability standards have promoted interoperability and significant competition in the public safety communications equipment marketplace.¹⁴ Again, in 2007, the Commission advanced narrowband interoperability by consolidating the 700 MHz narrowband spectrum into a block adjacent to the 800 MHz narrowband spectrum.¹⁵ The Commission found that “consolidating the narrowband segments will . . . creat[e] a contiguous public safety broadband allocation adjacent to commercial broadband spectrum, distancing the narrowband segment from the broadband segment to minimize interference potential.”¹⁶ The Commission further concluded that “consolidating the narrowband segments in this manner will maximize spectrum efficiency, thereby reducing the need for internal guard bands between narrowband and broadband operations from two separate guard bands to only one internal guard band.”¹⁷ Since that time,

¹² *Id.* at ¶ 7.

¹³ *The Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communication Requirements Through the Year 2010*, Fourth Report and Order, 16 FCC Rcd 2020, ¶ 2 (2001); see also 47 C.F.R. § 90.547(a)(2).

¹⁴ Comments of Motorola, Inc., PS Docket No. 10-168 (Sept. 20, 2010); see also *The Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communications Requirements Through the Year 2010*, Eighth Notice of Proposed Rulemaking, 21 FCC Rcd 3668, ¶ 7 (2006) (“[M]obile and portable narrowband radios are required to be capable of operating on the interoperability channels using the Project 25 standard, ensuring that all public safety entities using 700 MHz narrowband radios will be able to communicate with each other.”).

¹⁵ *Second Report and Order* at ¶ 329.

¹⁶ *Second Report and Order* at ¶ 329.

¹⁷ *Id.*

the public safety community has invested significant financial and human resources to build out these interoperable narrowband networks.¹⁸

The importance of narrowband spectrum for mission-critical voice cannot be overstated.¹⁹ Unlike the proposed public safety broadband networks, land mobile radio enables continued communications through the use of radio talk-around.²⁰ This enables public safety radios to operate without infrastructure or a network. Years of additional product development and standards work are needed before this functionality can be incorporated into broadband platforms. Additionally, because they do not rely on cellular architecture, narrowband technologies provide for more cost-effective coverage than broadband networks, especially in rural areas. In short, it will be a long time before narrowband voice systems are replaced by alternative designs. The Bureau's Notice recognizes this by stating that "[p]roviding sufficient capacity and performance for public safety narrowband operations remains of critical importance to existing public safety communications systems, and that until broadband is capable of

¹⁸ While the 700 MHz allocation has been in place for approximately a decade, the spectrum has been available nationwide only for a little over a year due to the extended transition to remove TV facilities from the spectrum. Thus, the extent of narrowband deployment must be viewed in this context given that the 700 MHz spectrum has been fully available to public safety since only June of 2009. See *Implementation of the DTV Delay Act, DTV Customer Education Initiative*, Second Report and Order and Notice of Proposed Rulemaking, 24 FCC Rcd 2526, ¶ 1 (2009).

¹⁹ For its part, all new Motorola subscriber models since 2001 that support 800 MHz also support 700 MHz, even though this extension band was not fully available nationwide until June 2009 when the digital television transition concluded. 700 MHz P25 subscriber devices—shipped since 2006—all have included the additional capability to operate in the 800 MHz band, thereby enabling interoperability across 800 MHz and 700 MHz spectrum resources. In most cases, customers purchased these radios with this extra capability in anticipation of using the 700 MHz narrowband service for interoperable voice.

²⁰ Andrew Seybold comments that "LTE cannot support simplex, tactical, or talkaround (in Internet speak: peer-to-multi-peer) without the use of a cell site." Letter from Andrew Seybold to Marlene H. Dortch, FCC, at 19 (filed Sept. 10, 2010).

supporting mission-critical voice operations, narrowband will continue to play a central role in first responder communications.”²¹

The *Notice*, however, threatens to undermine the prospect of nationwide narrowband interoperability and, more broadly, narrowband public safety communications. If the narrowband allotment and the adjacent guard band were available for broadband deployment, it is appropriate to assume that this would be realized by 5 MHz broadband signal occupying the 768-773/798-803 MHz band. This could either be a stand-alone broadband network or combined with the public safety broadband spectrum at 763-768/793-798 MHz to form a 10 MHz broadband carrier. In either case, this would require that an *ad hoc* 1 MHz wide guard band be inserted at 773-774/803-804 MHz to protect remaining narrowband channels operating in same geographic area. It is possible that some narrowband systems could operate on some of these channels in the guard band but they would do so with degraded performance and higher risk of interference.

This scenario leaves only a 2 x 1 MHz block (774-775/804-805 MHz) available for narrowband operations in the geographic area of the broadband system. In other words, over 80 percent of the narrowband channels will be lost or suffer degraded performance including:

- 75 percent of the interoperability channels, including the National Calling channel pair;
- 75 percent of the existing reserve spectrum, which NPSTC has petitioned be used for low power, transportable trunked systems;²²

²¹ *Public Safety and Homeland Security Bureau Seeks Comment on the Technical and Operational Feasibility of Enabling Use of the 700 MHz Public Safety Narrowband Allocation and Guard Band for Broadband Services*, Public Notice, PS Docket No. 06-229, at 2 (PSHSB Sept. 28, 2010).

²² *See* Petition for Rulemaking of the National Public Safety Telecommunications Council, RM-11433 at 7 (Feb. 8, 2008).

- 75 percent of State channels;
- 50 percent of low power channel pairs;
- 89 percent of the narrowband general use channels.

The loss of these channels for narrowband use would seriously disrupt existing plans for the deployment of 700 MHz voice communications networks. Repacking all of the interoperability channels into the remaining 1 MHz of spectrum will leave practically no channels available for networks that accommodate general use voice applications and would effectively preclude all State-governed networks.

The *Notice* asks if nationwide narrowband interoperability could “be maintained based on the existing distribution of designated interoperability channels in the 700 MHz narrowband channel plan, or would reconfiguration of the channel plan be necessary to add or shift interoperability channels to other portions of the band?”²³ The above review shows that reconfiguration would be necessary and the resulting disruption to the narrowband allotment will require redevelopment of national interoperability plans. Those regions that deploy broadband on narrowband channels will be unable to provide narrowband interoperability functionality consistent with the rest of the country.

This would be highly intrusive considering public safety’s significant progress within the confines of the current channel plans. As of November 22, 2010, thirty-five RPC plans had received Commission approval with another four plans pending approval. Additionally, the Commission has already issued 700 MHz narrowband licenses to each state and over 350 additional regional and local licenses and STAs. Also, over the last year, the number of PS licensees building out narrowband systems under the current plan more than doubled – largely

²³ *Notice* at 3.

due to the completion of the DTV transition. And many additional public safety agencies are now starting to implement plans for 700 MHz narrowband mission critical systems.

Unfortunately, the Bureau's proposal to permit neighboring agencies or state authorities to annex narrowband spectrum for broadband use will slow down many agencies' deployment plans. This is especially so given that this would be the Commission's second major reconfiguration of the 700 MHz narrowband channel plans.²⁴ The Commission previously redrafted the 700 MHz channels in 2007 in order to move the narrowband spectrum into a single allocation and provide a guard band between the narrowband spectrum and the newly allocated broadband spectrum. In fact, many public safety licensees are still building 700 MHz narrowband systems originally started under the first 700 MHz plan over three years ago. And these licensees have not received any resolution from the Commission on how they must relocate their systems to the current narrowband plan. The Bureau's instant proposal would further complicate this situation. For example, states with plans to deploy narrowband systems on the 700 MHz state channels currently have relatively straightforward rules for sharing the channels with adjacent states. If different technologies are deployed at the borders, these simple sharing rules would need to be replaced by more rigorous coordination, including review and concurrence by the respective State Interoperability Executive Committees (SIECs) or other bodies with coordination and signoff responsibilities. Similarly, RPC's will face more complex coordination scenarios if one region uses narrowband and another chooses to use broadband.

The chilling effect on the near-term deployment of narrowband networks must also be considered in terms of the minimal benefits – at least in the near term – from allowing broadband

²⁴ Under the Commission's previous channel plan, the 700 MHz public safety band plan separated two three-megahertz paired narrowband blocks by a contiguous block of six megahertz paired spectrum identified for wideband use.

systems on the narrowband channels. Allowing broadband technologies to operate on the 768-773/798-803 MHz band would create a unique band that is not currently defined in worldwide broadband equipment standards developed by 3GPP. Thus, additional standards work will be necessary before this spectrum could be deployed for broadband. Based on the current schedule for future standards activity, it is Motorola's opinion that this issue would not be prioritized until at least 2012 before it received any consideration. And the necessary standards work will not be as easy as simply adding a new band class to the current list. For example, technical analysis and standards will be needed to determine the impact of reduced duplexer spacing between the combined public safety frequencies and the upper 700 MHz C Block (Band 13).²⁵ If this issue cannot be resolved, the public safety band will become a unique band and public safety will lose any advantage of "COTS" manufacturing economies of scale. In the meantime, 700 MHz narrowband deployment is likely put on hold during the lengthy standards process.

²⁵ Currently, the public safety broadband block at 763-768 MHz is 8 MHz below the commercial Upper 700 MHz C-Block at 776-787 MHz. Allowing public safety broadband devices to operate on at least some portion of the guard band and narrowband allotment would significantly reduce this separation, which would significantly increase concerns for potential interference between the two blocks.

III. Use of 700 MHz Narrowband Spectrum for Broadband Will Dramatically Increase the Potential for Interference Between Broadband and Narrowband Public Safety Users.

The Notice asks if broadband operations in the 700 MHz narrowband spectrum would “interfere with existing or future public safety narrowband operations?”²⁶ The simple answer is yes. As detailed below, permitting public safety to use the narrowband 700 MHz spectrum for broadband will increase the potential for interference.

History shows that mixing system technologies in the same spectrum is a recipe for interference. A prime example is the 800 MHz band. The interference problem in the 800 MHz band was “caused by a fundamentally incompatible mix of two types of communications systems: cellular-architecture multi-cell systems—used by ESMR and cellular telephones licensees—and high-site non-cellular systems—used by public safety, private wireless, and some SMR licensees.”²⁷ As the Commission explained, the public safety interference problem would “only increase in severity as private, public safety and commercial use of the 800 MHz band intensifies.”²⁸ Ultimately, the Commission ordered the 800 MHz transition, which it deemed “necessary to ensure that first responders . . . have communications channels free of unacceptable interference and thereby suitable for mission-critical operations.”²⁹ To date, the

²⁶ Notice at 3.

²⁷ *Improving Public Safety Communications in the 800 MHz Band*, Report and Order, Fifth Report and Order, Fourth Memorandum Opinion and Order, and Order, 19 FCC Rcd 14969, ¶ 2 (2004).

²⁸ *Id.* at ¶ 13.

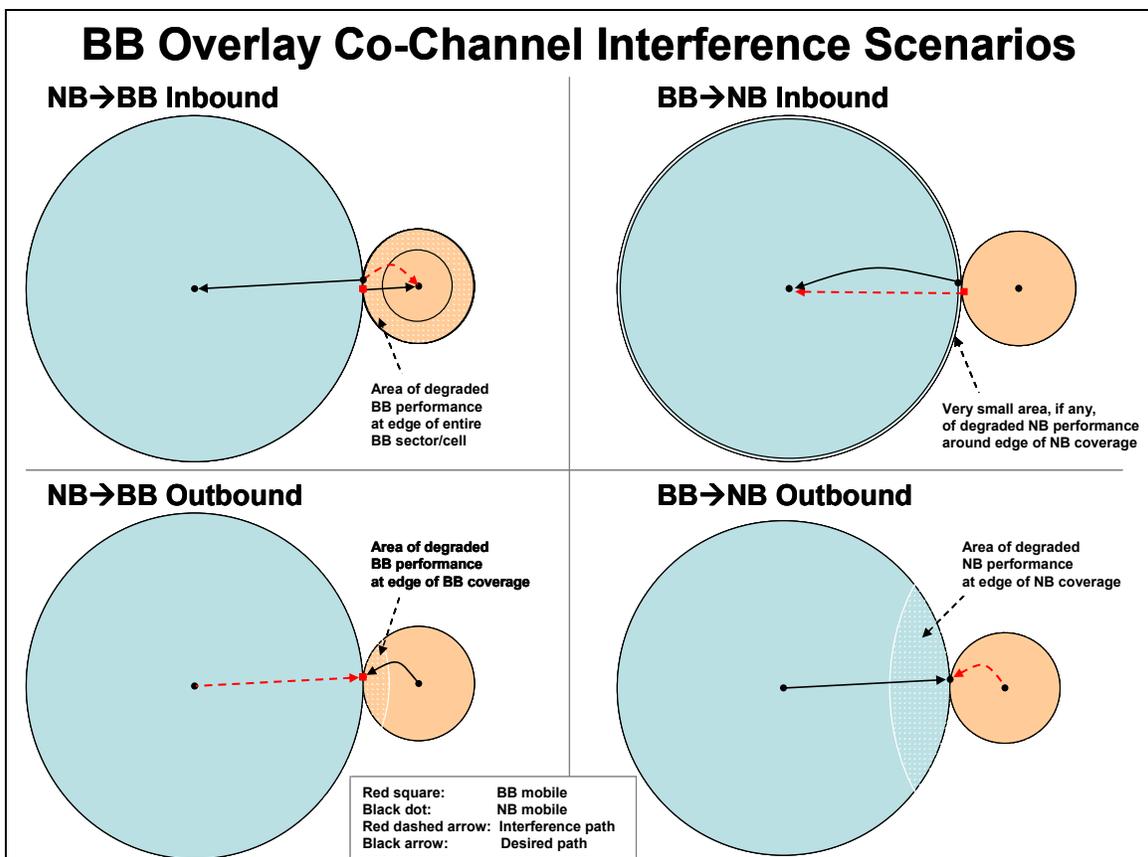
²⁹ *Id.* Obviously, the 800 MHz process has been timely, costly, and problematic. The 800 MHz transition was ordered in 2004, and is still ongoing. Numerous organizations have requested and received waivers of the transition requirements. In June 2010, the PSHSB released an Order again postponing the 800 MHz reconfiguration financial reconciliation “true-up” deadline until December 31, 2010. *Improving Public Safety Communications in the 800 MHz Band*, Order, 25 FCC Rcd 8217, ¶ 1 (2010).

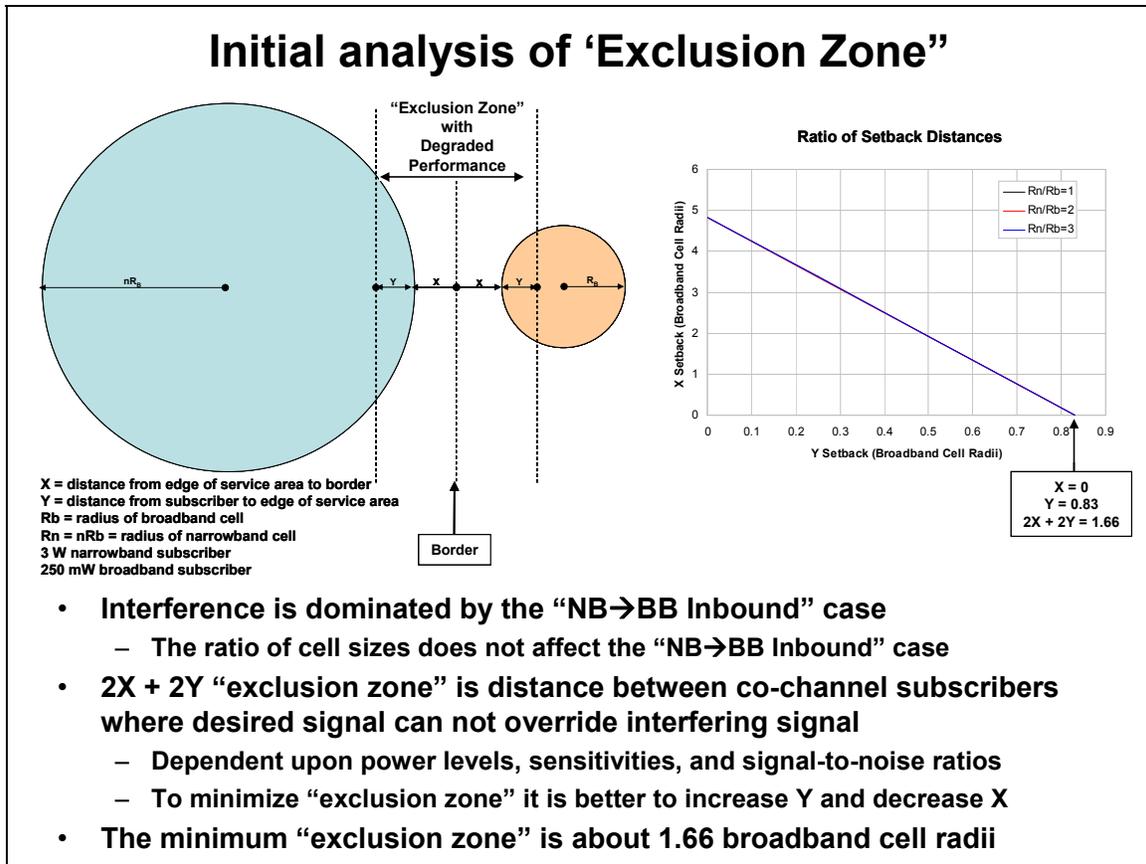
800 MHz interference transition is in its sixth year with no end in sight and is likely to cost the industry more than \$4 billion to complete.

The Commission could be creating similar conditions that existed in the 800 MHz band before reconfiguration should it allow broadband systems to operate in the narrowband allotment. In particular, interference will be likely at border areas where one agency uses the 700 MHz spectrum for narrowband and the agency in the adjacent jurisdiction uses broadband on the same frequency channels. Additionally, interference will occur when a roaming narrowband radio enters a mutual aid situation in an area where the narrowband channels have been redirected for broadband use.

The co-existence of broadband and narrowband technologies on the same frequencies creates several co-channel interference scenarios. The most dominant would be interference from high power narrowband subscribers to broadband base receivers (*i.e.*, NB to BB Inbound). Although intermittent in nature, transmissions from 3 watt portables and up to 30 watt mobiles can reduce the effective radius of the entire adjacent broadband cell by greater than 80%. The area of degraded performance, or “exclusion zone”, between narrowband and broadband operations is at least 1.66 times broadband cell radius. For 1 km radius broadband cell, the exclusion zone would need to be at least 1.7 km (approximately 1 mile) wide. If, for example, a relatively small city like Washington, DC (177 sq km) implemented a broadband network and needed to provide exclusion zones around the city’s borders to protect neighboring narrowband systems, Motorola calculates that up to 37 percent of the city’s land area could experience degraded performance, even with customized coverage patterns along the city’s border.

Two other interference scenarios from base transmitters to subscriber receivers (NB to BB outbound and BB to NB outbound) are also possible. This interference is near-continuous and raises the noise floor for subscriber receivers at the edge of service area. A public safety entity with an existing or planned narrowband system may need to re-design coverage along its border to overcome the increased noise floor from a broadband system implemented in an adjacent jurisdiction. Because of the difference in subscriber power levels, a fourth scenario involving broadband subscriber device to narrowband base receivers (BB to NB inbound) is unlikely to cause significant issues. These scenarios are depicted in the following diagrams.





This derivation of the width of the required exclusion zone should be viewed as a best-case scenario as it does not consider interference caused by roaming broadband devices that have extended beyond their network’s service area and into the protected service contours of nearby narrowband networks. While the exclusion zones described above are the minimum necessary from a technical perspective, greater separations will likely be necessary in the real world to account for the fact that users typically do not monitor their locations so precisely. Also, one of the major benefits of narrowband land mobile radios is the ability to conduct unit-to-unit communications without need for infrastructure. Such communications will cause interference if they are conducted in areas where the narrowband frequencies are used for broadband. Technical standards, operational restrictions and protocols would be needed to minimize the

interference potential. At the end of the day, such rules would likely impair and increase the cost of one of the major operational benefits of narrowband radios.

IV. In Lieu of Repurposing Narrowband Spectrum, the Commission Should Work With Congress to Provide More Broadband Spectrum for Public Safety by Reallocating the Upper 700 MHz D-Block.

The Bureau's goal of increasing the spectrum available for broadband public safety communications is beyond reproach. Motorola simply disagrees with how the Bureau proposes to accomplish the goal. As detailed above, opening up the 700 MHz narrowband spectrum for broadband use would cripple narrowband interoperability efforts, generate harmful interference among public safety users, and require yet another reconfiguration of the 700 MHz channel plans, introducing unwarranted delay and uncertainty. Instead of adopting the *Notice's* proposal, the Commission should recommend to Congress that it reallocate the 700 MHz D Block for public safety broadband use.³⁰

This approach avoids all of the above issues, and provides public safety with the much-needed 10 + 10 MHz of broadband channels. The fact that the 2 x 5 MHz D Block is directly adjacent to the 2 x 5 MHz broadband public safety band will foster interoperability by allowing public safety to build an interoperable network with a the same spectrum allocation nationwide. This will significantly reduce the cost and complexity of the network equipment and devices compared to having the spectrum split across two non-adjacent bands. Additionally, by combining the two bands, public safety could utilize the entire 2 x 10 MHz, whereas having the D Block separated as commercial spectrum will necessitate wasting spectrum to carve out a guard band between D Block and public safety. Finally, combining the D Block with the

³⁰ Even if the Commission is unable to persuade Congress, the *Notice's* proposal should still be rejected for the reasons discussed above.

existing public safety broadband allotment into a single, nationwide allocation will facilitate more effective planning for broadband interoperability than would the alternative of allowing some regions to use the narrowband allotment for broadband while others do not. Clearly, developing interoperability protocols and procedures is more complicated and less effective on non-standardized frequency bands.

V. Conclusion.

Motorola strongly opposes the *Notice's* proposal. As detailed above, opening up the 700 MHz narrowband spectrum for broadband use would cripple narrowband interoperability efforts, generate harmful interference among public safety users, and diminish much of the narrowband deployment progress that public safety entities already have achieved. Instead of adopting the *Notice's* proposal, the Commission should recommend that Congress expeditiously reallocate the 700 MHz D Block for public safety broadband use.

Respectfully submitted,

By: /s/ Barry Lambergman
Barry Lambergman
Director, Government Affairs
Motorola, Inc.
1455 Pennsylvania Avenue, NW
Washington, DC 20004
TEL: 202.371.6900

Dated: December 3, 2010