

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of

Improving Public Safety Communications in the
800 MHz Band

Consolidating the 900 MHz Industrial/Land
Transportation and Business Pool Channels

WT Docket No. 02-55

REPLY COMMENTS OF MOTOROLA, INC.

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Summary

Motorola believes that a logical set of principles can be used to define a regulatory solution that will effectively reduce the amount of interference experienced by public safety users while remaining sensitive to the spectrum needs of other radio services. After careful consideration of the other comments submitted in the proceeding and with full knowledge of the consensus plans being developed by other parties, Motorola offers a plan that may also serve as a way forward on resolving these complex issues by realigning the 800 MHz and 700 MHz bands.

Motorola believes that this plan better achieves the objective of attempting to keep all existing 800 MHz operators and licensees “whole” in terms of their frequency assignments. Also, this plan attempts to be simpler in terms of implementation in that it focuses on an 800 MHz solution for an 800 MHz interference problem and avoids the political complications inherent with the inclusion of other frequency bands.

Like other band realignment proposals, Motorola’s recommendation is based on segregating 800 MHz “high-site” communications systems used by public safety, business, industrial, land transportation and SMR operators from the “low-site” cellular configurations deployed by some commercial operators. A key difference between Motorola’s proposal and other industry recommendations is that the size of some of the resulting “sub-allocations” would not be fixed across the country but, rather, the amount of spectrum available to cellular-like systems, public safety systems and non-public safety systems would vary depending on the amount of spectrum currently licensed to each category.

In addition, Motorola recommends that the FCC, in cooperation with Congress and the NTIA, consider reallocating the remaining 30 MHz of commercial spectrum in the upper 700 MHz band, to both state and local public safety use and Federal Government, including related DOD operations. This will provide spectrum to meet the documented needs of public safety and enhance public safety interoperability capabilities in furtherance of a compatible Homeland Security response. Motorola also recommends that the FCC should rely on the recommendations contained in the *Best Practices Guide* as a complementary solution for interference mitigation.

Motorola recognizes that further industry consensus would be needed on numerous implementation and funding issues associated with this or any other realignment proposal. Motorola's intent with this filing, however, is to provide an alternative solution that mitigates 800 MHz public safety interference while respecting the spectrum needs of all user groups and licensees. We look forward to further discussions with the industry and the Commission to clarify remaining issues.

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Motorola, Inc. (“Motorola”) is pleased to submit these reply comments in response to the Commission’s Notice of Proposed Rulemaking (“*NPRM*”) addressing harmful interference currently being received by 800 MHz public safety systems from systems deploying low-site cellular infrastructures.¹ As further described below, Motorola believes that a logical set of principles can be used to define a regulatory solution that will effectively reduce the amount of interference experienced by public safety users while remaining sensitive to the spectrum needs of other radio services. After careful consideration of the other comments submitted in the proceeding, and with full knowledge of the consensus plans being developed by other parties, Motorola offers an alternative plan that may also serve as a way forward on resolving these complex issues by realigning the 800 MHz and 700 MHz bands. The plan included in these

¹ Improving Public Safety Communications in the 800 MHz Band, Consolidating the 900 MHz Industrial/Land Transportation and Business Pool Channels, WT Docket No. 02-55, Notice of Proposed Rule Making, FCC 02-81 (rel. Mar. 15, 2002) (“*NPRM*”).

comments will provide preventative measures to mitigate the occurrence of interference and, also, recommends techniques that will allow users to better manage and coordinate system deployment to avoid the occurrence of interference. At the same time, this plan should not reduce the amount of spectrum available to existing 800 MHz licensees and will provide additional spectrum for public safety at 700 MHz.

I. Overview

The *NPRM* sought comment on potential solutions for resolving increasing levels of interference being received by public safety systems operating in the 800 MHz band caused by 800 MHz commercial wireless systems deployed in a cellular-like architecture. With its initial consideration being the recommendations contained in the *White Paper* submitted by Nextel Communications, as well as a similar set of recommendations submitted by the National Association of Manufacturers, the *NPRM* focused largely on solutions that would realign or “reband” the 800 MHz band in order to remove the traditional “interleaved” frequency assignments for public safety, commercial wireless and business and industrial wireless systems.² In addition, the *NPRM* sought comment on additional and complementary measures to reduce potential interference such as improved public safety radio receiver performance, more stringent CMRS out-of-band emissions requirements, and higher public safety signal levels.³

² *Id.* at ¶¶20-25.

³ *Id.* at ¶¶73-76.

Approximately 3000 pages of comments from well over 120 parties were filed in response to the *NPRM*. Given the embedded investments in this band, the wide variety of uses that it supports, and the breadth of the questions raised in the *NPRM*, it was not surprising that a clear consensus on how to resolve the issues at hand did not emerge from the first round of comments. Indeed, reflecting the complex nature of the issue, many commenting parties could not even agree on whether the extent of the interference demanded a preventative, holistic response or whether case-by-case resolutions would provide the most efficient and least costly solution for protecting public safety communications.⁴

In its opening round comments, Motorola recommended that the Commission rely on the following key principles for evaluating any proposals.⁵ Specifically, Motorola urged that any long-term proposed plan should, to the maximum extent possible:

- Enable an effective process to mitigate interference in the short term and eliminate interference to the extent possible over the long term;
- Provide an environment that strengthens the ability of first responders to upgrade and/or expand their systems to meet their Homeland Security and interoperability needs;
- Respond to the public safety community’s documented need for additional spectrum;
- Ensure that critical infrastructure users also have sufficient spectrum, adjacent to public safety for interoperability required during emergencies;
- Ensure that industrial, business and Specialized Mobile Radio (“SMR”) users do not lose spectrum or their primary status as licensees; and

⁴ See, e.g., Comments of Snohomish County, WA Emergency Radio System, at 2, Comments of Madison County East Transit District at 7, Comments of the American Petroleum Institute at 3, Comments of the National Rural Electrical Cooperative Association at 8, Comments of Access Spectrum, LLC at 5.

⁵ Comments of Motorola at 3.

- Provide a smooth transition that includes sufficient funding, allows migration with no loss of service, and does not place an undue burden on any 800 MHz licensee.

In our view, the principles articulated by Motorola encapsulate the fundamental themes expressed by the other commenters in this proceeding. For example, many parties recommended that the FCC pursue a dual-track regulatory response that includes both near-term solutions (*e.g.*, case-by-case resolutions relying on the *Best Practices Guide*⁶) and longer-term solutions such as realigning the 800 MHz band, reallocating the remaining 700 MHz spectrum to public safety, and potentially improving public safety mobile and portable receivers.⁷ Many commenters, including non-public safety organizations, support allocating additional spectrum for Public Safety users.⁸ Further, many commenters argue that funding must be available for any relocation of 800 MHz incumbent licensees and that the process must ensure no loss of service.⁹ Many

⁶ *Avoiding Interference Between Public Safety Wireless Communications Systems and Commercial Wireless Communications Systems at 800 MHz – A Best Practices Guide* (Dec. 2000) (*hereinafter Best Practices Guide*).

⁷ *See, e.g.*, Comments of Association of Public-Safety Communications Officials-International, Inc. (“APCO”) *et al.*, May 6, 2002, at 9-10; Cellular Telecommunications & Internet Association (“CTIA”) Comments, May 6, 2002, at 6-10; National Association of Manufacturers and MRFAC, Inc. (“NAM/MRFAC”) Comments, May 3, 2002, at 4; Southern LINC Comments, May 6, 2002, at 14, 16-30.

⁸ *See, e.g.*, APCO *et al.* Comments at 11-19; Comments of Nextel at 16, Comments of AT&T Wireless, May 6, 2002, at 11; Comments of the City of New York, Department of Information Technology & Telecommunications (“City of New York”) at 3-5; Comments of the International Association of Chiefs of Police (“IACP”) *et al.*, May 6, 2002, at 6-8; Comments of the International Association of Fire Chiefs, Inc. & International Municipal Signal Association (“IAFC/IMSA”), May 6, 2002, at 8-9; Comments of the Public Safety Wireless Network (“PSWN”) Program, May 3, 2002, at 8-9; Southern LINC Comments at 28; Comments by the State of Florida, May 6, 2002, at 3-4.

⁹ *See, e.g.*, APCO *et al.* Comments at 22; City of New York Comments at 8; IACP *et al.* Comments at 5-6, 8-9; IAFC/IMSA Comments at 10-11; Comments of Lockheed Martin Corp., May 6, 2002, at 6-9; NAM/MRFAC Comments at 5-6; PSWN Program Comments at 12-13; Southern LINC Comments at 34-38; Comments by the State of

commenters support the principle that Business and Industrial Land Transportation (“B/ILT”) and SMR licensees should not lose spectrum or their primary licensing status in any adopted solution.¹⁰ Numerous commenting parties support a specific spectrum allocation for critical infrastructure users and the need for increased interoperability between these users and Public Safety users.¹¹

Motorola’s review of the record confirms our belief that the above-referenced principles should guide the FCC as it establishes a solution to the existing problem. Motorola recognizes, however, that this high-level review must be reduced to detailed specifics if public safety is to get near-term relief from the harmful interference it is currently experiencing. Swift resolution of this proceeding will also provide the regulatory certainty necessary for public safety to continue deployment of systems to meet its Homeland Security and interoperability needs. Likewise, commercial operators like Nextel and Southern LINC as well as business and industrial users need regulatory certainty so they can again focus on their core operations that benefit the American economy and consumers. Under these considerations, Motorola has developed a plan to realign the 800 MHz band in accordance with the above-referenced principles to the maximum extent possible. This plan also involves the reallocation of spectrum from the upper 700 MHz band to provide additional capacity to meet the documented needs of the

Arizona, May 3, 2002, at 4; State of Florida Comments at 5-6; Comments of the Telecommunications Industry Association (“TIA”), May 6, 2002, at 2.

¹⁰ See, e.g., IAFC/IMSA Comments at 10; Lockheed Martin Comments at 9-11; NAM/MRFAC Comments at 8; Southern LINC Comments at 48; TIA Comments at 2.

¹¹ See, e.g., Comments of Cinergy Corp., May 6, 2002, at 60-61; Comments of Duke Energy Corp., May 6, 2002, at 4; Comments of Florida Power & Light Company, May 6, 2002, at 6-7; Comments of SCANA Corp., May 6, 2002, at 41-42; Southern LINC Comments at 29; Comments of the United Telecom Council, May 6, 2002, at 30.

public safety community and to allow greater interoperability capabilities among state, local and Federal Government public safety organizations.

Motorola is fully aware of the efforts that other industry participants are pursuing in developing a broad-based consensus plan. Motorola is also aware of other proposed solutions such as the one promoted by Cingular.¹² Motorola believes that each of these plans contain elements that have merit and therefore applauds the industry's diligent and committed efforts to resolve this most complicated issue. Overall, these efforts generally align well with the principles that Motorola has set forth and would not disserve the public interest.

However, Motorola believes that the plan included herein better achieves the objective of attempting to keep all existing 800 MHz operators and licensees "whole" in terms of their frequency assignments. Also, as further detailed below, this plan attempts to be simpler in terms of implementation in that it focuses on an 800 MHz solution for an 800 MHz interference problem and provides spectrum at 700 MHz to meet the needs of public safety. While the implementation challenges for any broad scoped plan will be daunting, reducing the level of controversy and complexity will allow industry resources to be focused where they should be – mitigating public safety interference.

II. Proposals for Mitigating 800 MHz Interference to Public Safety

After full review of the record, and based on its field experience in developing and deploying tens of thousands of 800 MHz land mobile systems, Motorola offers the following recommendations to the FCC for mitigating the 800 MHz interference to public

¹² Joint comments of Cingular Wireless LLC and ALLTEL Communications, Inc at 16-19.

safety systems. As more fully explained below, Motorola recommends that the Commission segregate 800 MHz “high-site” communications systems used by public safety, business, industrial, land transportation and SMR operators from the “low-site” cellular configurations deployed by some commercial operators. A key difference between Motorola’s proposal and other industry recommendations is that the size of some of the resulting “sub-allocations” would not be fixed across the country but, rather, the amount of spectrum available to cellular-like, ESMR systems, public safety systems and non-public safety systems would vary by geographic market depending on the amount of spectrum currently licensed to each category. In addition, Motorola recommends that the FCC, in cooperation with Congress and the NTIA, consider reallocating the remaining 30 MHz of commercial spectrum in the upper 700 MHz band, to both state and local public safety use and Federal Government, including related DOD operations. This will provide spectrum to meet the documented requirements of public safety, benefit public safety interoperability capabilities in furtherance of a unified Homeland Security response, and provide additional options for resolving interference on a case-by-case basis. Finally, the FCC should rely on the recommendations contained in the *Best Practices Guide* as a complementary solution for the resolution of interference.

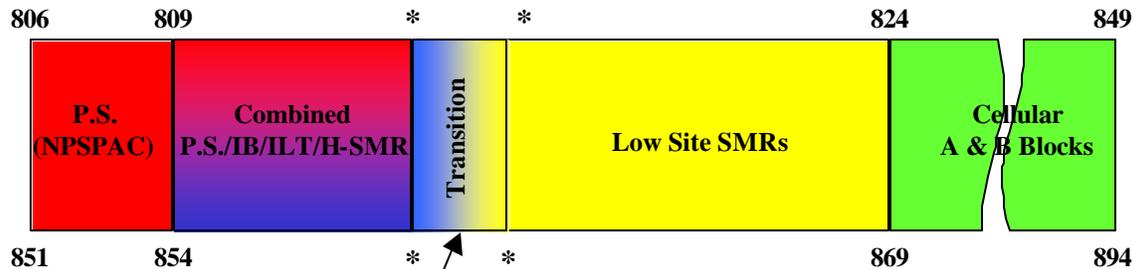
Motorola recognizes and supports the legitimate spectrum needs of Nextel, Southern LINC and other commercial wireless providers as well as the industrial, business and land transportation users that all operate in the 800 MHz band. It is without question that these communications systems benefit the American economy, serve the public interest and have an equally heavy investment in the 800 MHz band. In order to comply with goal of preserving 800 MHz spectrum for all classes of licensees,

Motorola's realignment proposal regrettably does not provide for additional 800 MHz spectrum for public safety, or provide 800 MHz spectrum for auction to CMRS carriers, but it does provide additional spectrum for public safety in the 700 MHz band. Given the heavy use of the 800 MHz band, providing additional spectrum for any user group would require the removal of some existing licensees from 800 MHz; an outcome that would complicate and delay resolving the 800 MHz interference problem.

The following figures depict a proposal for the 700 MHz and 800 MHz bands. At the outset, Motorola recognizes that many aspects of this proposal will require further discussion with other industry representatives and government officials to fully develop the implementation details. For example, Motorola recognizes that industry consensus is needed on the frequency coordination process for determining frequency swaps in markets across the country. Such discussions and consensus must include cooperation from Nextel who is uniquely able to create short term "green space" to facilitate the band realignment. Our intent with this filing, however, is to provide an alternative band plan that mitigates 800 MHz public safety interference while respecting the spectrum needs of all user groups and licensees. We look forward to further discussions with the industry and the Commission to clarify the implementation details.

Motorola Proposed 800 MHz Band Realignment

Mobile Transmit Band



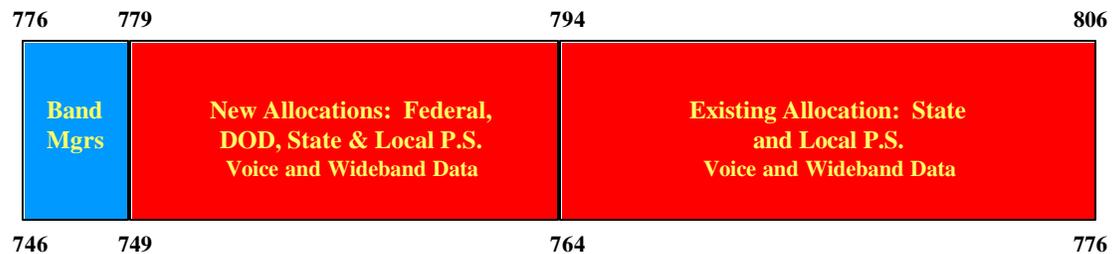
Base Transmit Band

Business, Industrial, High-SMR and Low-SMR Depending on Market

* = Varies by Geographic Market

Motorola Proposed 700 MHz Band Realignment

Base Transmit Band



Mobile Transmit Band

A. Description of 800 MHz Plan

Motorola strongly concurs with those that argue that the root cause of this interference scenario is the basic incompatibility of “low antenna site” CMRS cellular designs with “high antenna site” systems used by Public Safety and other private wireless users. Like the majority of commenting parties, Motorola agrees that the key to mitigating this interference is to segregate these two types of system designs by as much frequency spacing as possible, with the highest priority given to protecting public safety

users. The plan described herein realigns the 800 MHz band to separate high-site and low-site operations, minimizing the potential for interference and providing greater potential for additional interference mitigation methods.

To account for local licensing conditions, Motorola recommends flexible boundaries for the sub-allocations throughout the band. Over the years, the FCC has adopted numerous and, at times, conflicting licensing policies for 800 MHz systems. Thus, the original sub-allocations that comprised the interleaved band plan no longer accurately describe the types of systems (*i.e.*, commercial use or private wireless or public safety) that operate on specific channels. In other words, a frequency designated for industrial/land transportation use may be operated by a commercial wireless provider such as Nextel and Southern LINC in any number of markets around the country. Motorola believes that the realignment of the 800 MHz band should take these market-by-market variations into account.

Under the proposed plan, the public safety allocation at the 821-824/866-869 MHz band (*i.e.*, the “NPSPAC” band) would be relocated *in toto* to the 806-809/851-854 MHz band. Existing users of the NPSPAC channels would be relocated according to a direct channel-by-channel translation, thereby avoiding disruption of the regional plans that have been developed for use of these channels.¹³ To begin this transition “green space” would have to be created in the 806-809/851-854 MHz band. Nextel is uniquely

¹³ See §90.16 of the FCC’s Rules.

situated to create such green space as it transitions to a more efficient technology that will allow 6:1 channel use through advanced digital technology.¹⁴

The former NPSPAC band at 821-824/866-869 MHz band would be reallocated to the SMR service and available for use by low-site, cellular networks and would accommodate, to a large extent, SMR operations currently located below 816/861 MHz. This new SMR band would append to the existing “upper 200” SMR channels currently allocated in the 816-821/861-866 MHz band to form a contiguous block of spectrum for low-site SMR operations. This would create a 2x8 MHz block of spectrum for SMR operations.¹⁵ However, the total amount of spectrum available for such operations would vary on a market-by-market basis to keep the amount of spectrum currently licensed to each system whole in every market. Nextel, the licensee with by far the largest deployment of low site SMR systems, would be expected to occupy the majority of spectrum adjacent to the 821-824/866-869 MHz band.¹⁶ Use of this spectrum would be

¹⁴ See *Nextel and Motorola Announce iDEN Technology Upgrade*, Oct. 4, 2001, at http://www.corporate-ir.net/ireye/ir_site.shtml?ticker=NXTL&script=460&layout=-6&item_id=212206 (last visited August 6, 2002).

¹⁵ Information recently released by the FCC indicates that an SMR block of at least 16 MHz is justified based on an objective of licensees maintaining an amount of spectrum equivalent to what they are currently licensed. For non-border areas, this data indicates that of the total amount of licensed spectrum for SMR operators, including Nextel, is at least 53.9% of the total amount spectrum available. For example in markets where at least 36 MHz has been licensed, Nextel and other SMR licensees jointly hold between 20.6 MHz and 24.15 MHz. See Letters from Michael K. Powell to the Honorable W.J. Tauzin, the Honorable Fred Upton, and the Honorable Vito J. Fossella, dated July 26, 2002, (*Congressional Response*) responding to a request for information on current licensing in the 800 MHz band.

¹⁶ Information in the FCC’s *Congressional Response* shows that Nextel has a median of 18.4 MHz of spectrum in the top 100 markets. The total amount of spectrum available at 800 MHz in border areas varies from non-border areas and should be considered separately. It is likely that further analysis by the Commission and frequency coordinators will be necessary to substantiate the amount of spectrum held by each licensee category.

limited to low-site SMR operations or high-site SMR operations that are able or willing to operate in a low-site environment. Of course, such high-site operations would maintain the ability to convert to low site operation if they desire.

The “transition” block located adjacent to the low-site SMR block would provide additional flexibility to accommodate variations in the amount of spectrum held by each licensee category. While both low-site and high-site operations would be permitted in the transition band, low-site operations would be required to be located at the top of the band and not interleaved with high-site operations. However, because this band will be a mix of business, industrial, land transportation and SMR uses we anticipate that a number of systems will not fall clearly into either the high-site or low-site category and frequency coordinators should be provided some latitude to work with licensees to implement systems throughout this block.

To the extent that an SMR operator has both low-site and high-site operations, the FCC should encourage the operator to locate the high-site operations in the transition band and the low-site operations in the low-site SMR band. This will provide a more gradual transition from low to high site operations and help mitigate interference. Also, some systems relying on both high-site and low-site facilities have been deployed with cavity combiners that cannot be retuned to operate on contiguous channels. These users will need to interleave their assigned channels across a broader band of frequencies than perhaps would be available in a fixed block of spectrum for non-public safety, high-site operations. The “transition” and the lower portion of the “low site SMR” block may require interleaving of channels among SMR licensees to accommodate the use of cavity combiners on a market-by-market basis to minimize frequency rearrangement costs and

preserve coverage performance for incumbent operators. This will also allow use of existing equipment to the greatest extent possible and will provide an area of flexibility for deployment of high-site and low-site systems. However, the maximum protection against interference will be obtained by separating high-site and low-site systems.

Between the transition block and the new NPSPAC block at 806-809/851-854 MHz, would be a combined pool of channels to satisfy public safety, business, industrial, and land transportation (B/ILT) and high-site SMR users. These systems are deployed using a similar high site configuration, providing compatible operation for these services without interference. Allowing combined use of this spectrum among compatible services will help minimize relocation costs and maintain existing relationships as closely as possible. Allocations in this block would maintain interleaved assignments to accommodate incumbents' existing use of cavity combiners that require spacing between channel assignments on a given site. This proposal also provides the capability for critical infrastructure providers to coordinate operations more readily with public safety.

This plan will require close work by frequency coordinators to evaluate spectrum use in a market and determine the most efficient means to accommodate all users. As pointed out in our previous comments, actually retuning public safety systems will require significant program management to ensure that there is no disruption of service. Motorola believes, however, that this plan provides the flexibility necessary to accommodate the diverse variety of licensees and users currently occupying the 800 MHz band, while avoiding the political complications inherent in including numerous other frequency bands as part of the solution. Because this plan will require a larger number of 800 MHz licensees to relocate operations within the 800 MHz band than would proposals

that include other frequency bands, it will require close coordination and timing between the creation of green space to begin moving public safety operations through the completion of the realignment. Also, because it will be necessary to shift a greater number of incumbents, the costs of this plan can be expected to exceed plans that require less movement of licensees. Details for funding this transition must be finalized, but possible sources are revenue from spectrum auctions, voluntary funding,¹⁷ or legislation.

Upon adoption of any plan, the Commission should take steps to prevent future interleaving of incompatible high-site and low-site systems. Similarly, spectrum available in border regions with Canada and Mexico varies and existing channels in these border areas will need to be re-aligned according to the amount of spectrum held by each licensee to keep each licensee, whether public safety, B/ILT, or SMR, whole on a market-by-market basis. While the coordination in the border zones should be even more complicated, Motorola is confident that the basic components of its plan should equally apply in those areas.

B. Description of 700 MHz Proposal

Motorola believes that the realignment of the 800 MHz band, in addition with the complementary steps discussed below, will help mitigate the existing cases of public safety interference and reduce the potential for new cases to arise. However, even if good engineering practices are carefully observed, tension will continue to exist between

¹⁷ For instance, we note that in its *White Paper*, Nextel proposed to provide partial funding of relocation costs under certain conditions.

“noise-limited” and “interference-limited” systems and the continued threat of new interference situations will remain.¹⁸

This reality has led some parties to advocate that the Commission should act now to relocate public safety from the 800 MHz band altogether. These parties argue that public safety should realign itself in the recently allocated 700 MHz band and urge the FCC to reallocate the remaining 30 MHz of unassigned commercial spectrum in the upper 700 MHz band from commercial services to public safety.¹⁹ While Motorola strongly supports greater public safety access to the upper 700 MHz band, it does not support the complete removal of public safety from the 800 MHz band. Public safety has spent years developing and refining 800 MHz interoperability agreements and protocols as well as specialized equipment designs. It would take many years and significant monetary resources to replicate this implementation in the 700 MHz band. Further, the uncertain availability of the 700 MHz band and the process for clearing analog and digital TV broadcasters from Channels 60-69 renders the band as largely useless in many major urban areas for the next several years under the current regulatory structure. Public safety needs interference solutions today. Thus, total reliance on a 700 MHz solution is not practical at this time.

However, Motorola does believe that the upper 700 MHz band should be a part of an overall plan to meet the spectrum and communications requirements of public safety.

¹⁸ See *NPRM* at ¶24 for a discussion of “noise-limited” and “interference-limited” systems.

¹⁹ See *e.g.*, Joint Comments of Cingular Wireless LLC and Alltel Communications, Inc. at 17. The Upper 700 MHz band is defined as the 746-806 MHz band. At this time, the 747-762/777-792 MHz bands are allocated for commercial use but auctions have been delayed indefinitely.

To that end, Motorola supports industry efforts to reallocate the 30 MHz of spectrum currently allocated for commercial use in the upper 700 MHz band to strengthen the communications capabilities for local and state first responders, Federal Law Enforcement agencies and compatible Defense operations. In addition to providing spectrum needed to improve communications within these agencies, reallocating this 30 MHz of spectrum also provides the foundation for improved interoperability across local, state and Federal government departments so multiple entities can communicate with one another when the need arises.²⁰ This also provides a mechanism for the Commission to respond more fully to the documented public safety spectrum needs identified in the 1996 Public Safety Wireless Advisory Committee (“PSWAC”) Final Report.²¹ Together, the 700 MHz and 800 MHz spectrum dedicated solely to local, state, Federal and compatible Defense operations totals 60 MHz spectrum under the Motorola proposed plan (state and

²⁰ The Commission has long recognized the advantages of promoting Federal and State/local interoperability. *See e.g., The Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Agency Communications Requirements Through the Year 2010*, WT Docket No. 96-86, *Second Memorandum Opinion and Order*, FCC 00–264 (rel. August 1, 2000) at ¶43. The FCC has codified this support in Section 2.103 of its rules specifically, in part, to promote Federal and state and local interoperability at 700 MHz. Of course, interoperability would be further advanced if Federal and related DOD interest would have direct access to 700 MHz spectrum.

²¹ *Final Report of the Public Safety Wireless Advisory Committee to the Federal Communications Commission*, September 11, 1996, (*PSWAC Final Report*). In 1996, PSWAC concluded that an additional 97.5 MHz of spectrum would be needed to meet the requirements of public safety through 2010. *See, PSWAC Final Report* at §§ 4.4.1, 4.4.8. Since that time, the Commission has allocated for public safety uses 24 MHz in the 746-806 MHz band as well as the entire 4940-4990 MHz band. Providing at least an additional 23.5 MHz of spectrum at 700 MHz, and clearing broadcasters from the entire 746-806 MHz band, would fully meet the requirements described by PSWAC. The remaining 700 MHz spectrum would provide capacity for Federal users to implement broadband and interoperable technologies and provide for broadband interoperability with State and local emergency responders.

local public safety agencies would also have access their proportional share of the combined and transition 800 MHz spectrum blocks).

Motorola notes that the FCC has already auctioned 6 MHz from the 746-806 MHz band to guard band managers. Specifically, the bands 746-747/776-777 MHz and 762-764/792-794 MHz have been auctioned for this purpose. Motorola strongly supports the band manager concept as a means of providing spectrum access to those users not typically equipped to participate in spectrum auctions and, therefore, does not propose any reduction of the spectrum already assigned to 700 MHz Guard Band Managers. However, Motorola further notes that the reallocation of the 30 MHz of commercial spectrum to Federal and non-Federal public safety use would obviate the need for a “guard band” in the center of the Upper 700 MHz band to protect public safety operations. Motorola recommends addressing this by relocating the 762-764/792-794 MHz blocks so that they are immediately adjacent to the 746-747/776-778 MHz blocks respectively. This will consolidate the band manager spectrum, which will likely increase its usefulness while allowing contiguous spectrum for public safety. Motorola notes that it will be necessary to maintain the restrictions against low-site use of the 700 MHz guard-band spectrum to avoid interference to public safety.²² Of course, any reliance on the 700 MHz band to enable public safety communications is moot until the FCC, in cooperation with the Congress and the NTIA, reestablishes a regulatory framework that enables the prompt clearing of this band within the next few years and by 2006 at the latest. Under the current plan, this spectrum could remain occupied – and unusable by public safety in most populated areas of the country – probably until the

²² See §27.2(b) of the Commission’s Rules.

2010 to 2015 time frame. Motorola is encouraged by the Commission's recent aggressiveness in addressing matters such as digital must carry, copyright protection and consumer equipment issues in a manner that promises to accelerate the transition to digital television service and which will ultimately lead to 700 MHz band clearing. However, more work is needed especially as it relates to the clearing of TV Channels 60-69. Now is the time for renewed Congressional activity to develop more certainty for the clearing of the 700 MHz band independent of the status of the DTV transition.

C. 900 MHz

The 900 MHz (896-901/935-940 MHz) band plan currently interleaves channel assignment to the SMR and Business/Industrial/Land Transportation radio services.²³ Therefore, the band is subject to interference between prospective licensees if actions are not taken to segregate dissimilar system architectures. Indeed, Motorola understands that Nextel is in the process of deploying 900 MHz iDEN capable infrastructure and handsets using low-site deployment techniques. Thus, the potential exists for the 800 MHz interference scenario to appear in the 900 MHz band.

The FCC should act now to immediately allow licensees to resolve this potential situation at the local level. Commercial and non-commercial licensees should be encouraged to transfer and assign 900 MHz channels without regard to eligibility requirements to construct larger contiguous blocks of 900 MHz frequencies and reduce the negative impact of interleaved channel assignments.²⁴ To this end the Commission

²³ See §90.619 of the Commission's Rules.

²⁴ *In the Matter of Implementation of Sections 309(j) and 337 of the Communications Act of 1934 as Amended*, WT Docket No. 99-87, *Report and Order and Further Notice of Proposed Rule Making*, FCC 00-403, rel. Nov. 20, 2000, at ¶143.

should permit flexibility to promote channel swaps that reduce the potential for intermodulation interference and allow licensees to segment high-site and low-site systems. The FCC should carefully monitor this situation, however, and act quickly and more aggressively if market forces prove inadequate to minimize the potential for interference before it exists and should adopt measures to ensure that further interleaving of high-site and low-site systems does not occur.

D. Complementary Measures

As Motorola stated in our comments, regardless of which of the proposals are considered for reconfiguring the 800 MHz band, it is our belief that rebanding alone will not completely eliminate the interference that CMRS systems are causing to public safety, business and industrial systems. Motorola therefore believes that additional measures will be needed to help mitigate existing interference issues and minimize the likelihood that such interference will occur at new locations.

Like many of the commenting parties, Motorola supports FCC adoption of the techniques and recommendations included in the *Best Practices Guide*. Motorola agrees with the comments of the Private Wireless Coalition encouraging use of mitigation tactics that include “modifications for either system; filters for CMRS transmissions; and segregation of public safety and CMRS spectrum assignments...[I]licensees seeking to expand their systems, can minimize the potential for interference through advanced planning using frequency coordination procedures; purchasing equipment with high intermodulation specifications; and designing public safety systems to produce higher signal strength levels that reduce the impact of CMRS systems in the area.”²⁵

²⁵ Comments of the Private Wireless Coalition at 12, 13.

Encouraging the use of the procedures contained in the *Best Practices Guide* will buttress the positive impact of 800 MHz rebanding and minimize the occurrence of new interference problems.

Motorola described the types and causes of interference in its comments, with the primary factor in interference being the difficulty of coexistence between systems deployed in a high-site configuration and systems deployed in a low-site configuration. This creates the potential for a public safety user with a relatively weak desired signal to be attempting to operate in the presence of a strong undesired signal. While receiver design impacts the potential for interference, it appears that some commenters are overestimating the potential for receiver modifications to resolve interference problems.²⁶ As stated in our initial comments, Motorola supports FCC adoption of industry-developed receiver specifications for public safety radios and specifically stated its support for the use of Class A receiver specifications developed for public safety services by the Telecommunications Industry Association (“TIA”).²⁷ Motorola’s support for TIA’s class A specification was echoed by TIA’s Private Wireless Division, which comprises most of the manufacturers of public safety equipment, and EF Johnson as well.²⁸ The Class A specifications are targeted for state-of-the-art radio designs and specify -75dB (mobiles) and -70dB (portable) for intermodulation rejection. In

²⁶ See, e.g., Comments of the Cellular Telecommunications & Internet Association at 7, Comments of United Telecom Council at 17.

²⁷ See Motorola Comments at 21.

²⁸ See TIA Comments of the Private Radio Section of the Wireless Communications Division of the Telecommunications Industry Association, at 6 (stating that “we recommend referencing appropriate standards developed by TIA, such as TIA/EIA-603 for analog products and ANSI 102 for digital products); see also E.F. Johnson Comments at 5 (recommending adoption of the TIA/EIA-603-A Class A standard in the event that receiver standards are mandated).

Motorola's view, the Class A specification appropriately balances cost and performance tradeoffs in receiver design.

While adoption of a receiver standard will ensure necessary receiver performance, it will not resolve the interference at 800 MHz absent additional procedures as described in the *Best Practices Guide*. Realignment of the 800 MHz spectrum to separate high and low site operations will also help mitigate the interference and may allow manufacturers to develop and incorporate additional design features into future product designs once the overall plan for moving forward is finalized and adopted. Intermodulation interference rejection is primarily a function of the linearity of the components within the radio and the environment in which the radios must operate. Advances in these components have resulted in approximately 10-15 dB improvements in intermodulation interference rejection for public safety receivers over the last 15 years. Unfortunately, during this same period of time, the operating environment for public safety has become significantly more challenging with the proliferation of low-site commercial systems. While Motorola expects further improvements in public safety receiver design, it does not anticipate further large scale advances in intermodulation rejection.²⁹

²⁹ To this end, some commenting parties have expressed concerns about the filter characteristics of public safety radios, especially those developed by Motorola to operate in both the 700 and 800 MHz bands. These parties are concerned that such dual-band designs will increase the size of the receiver's "front-end" and increase the potential for intermodulation interference. These dual-band radios do not have front-ends that cover 764-869 MHz as a contiguous block. Rather, these radios typically employ ceramic variable-tuned filters that allow the front-end filters to move across the 764-869 MHz band depending on the desired signal frequency. The variable-tuned filter has the same "passband" as the fixed filter used for 800 MHz-only radios. Thus, when the radio is tuned for frequencies in the 700 MHz band, it will filter out undesired signal energy being transmitted from stations in 851-869 MHz.

III. Conclusion

The band realignment proposals set forth here by Motorola will help ameliorate existing and future instances of public safety interference and, also, provide Federal and local public safety with needed additional spectrum to better coordinate Homeland Security defense initiatives. While additional work is certainly needed, Motorola urges the FCC to consider these concepts as it works toward a solution that treats all 800 MHz spectrum users fairly.

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Motorola reminds the Commission that the primary purpose of front-end filters is not to control intermodulation interference as some parties have implied. Rather, this filter is used primarily to protect the receiver from spurious emissions while providing the requisite sensitivity to meet operational requirements.

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