

PROMOTING PUBLIC SAFETY COMMUNICATIONS

***REALIGNING THE 800 MHz LAND MOBILE RADIO BAND TO RECTIFY
COMMERCIAL MOBILE RADIO – PUBLIC SAFETY INTERFERENCE
AND ALLOCATE ADDITIONAL SPECTRUM TO MEET CRITICAL
PUBLIC SAFETY NEEDS***

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I. INTRODUCTION

This White Paper recommends that the Federal Communications Commission (“FCC” or “Commission”) expeditiously commence a rulemaking proceeding to correct the causes of interference between commercial wireless and public safety radio communications systems in the 800 MHz band. As part of this initiative, the Commission should allocate additional spectrum at 800 MHz for public safety communications systems vital to the safety of life and property and our nation’s security. Specifically, the Commission should realign the 36 MHz of 800 MHz Land Mobile Radio spectrum, 806/824 - 851/869 MHz, to mitigate radio frequency (“RF”) interference between Commercial Mobile Radio Systems (“CMRS”) and Public Safety Radio Communications Systems and to double the amount of 800 MHz spectrum available for primary use by public safety communications systems.

Since 1996, the FCC has been seeking solutions to the various communications problems faced by the public safety community, including inadequate spectrum access and barriers to interoperability.¹ The Commission has acknowledged that public safety agencies have “scarce available spectrum,” particularly in large metropolitan areas,² and recently received a petition reiterating public safety’s critical need for additional spectrum to meet the communications challenges of this decade.³ Public safety providers need additional spectrum *now* to enhance

¹ *In the Matter of the Development of Operational, Technical, and Spectrum Requirements for Meeting Federal, State, and Local Public Safety Agency Communications Requirements Through the Year 2010*, Notice of Proposed Rulemaking, 11 FCC Rcd 12460, ¶ 1 (1996).

² *Id.* See also *In the Matter of the Development of Operational, Technical, and Spectrum Requirements for Meeting Federal, State, and Local Public Safety Agency Communications Requirements Through the Year 2010*, First Report and Order and Third Notice of Proposed Rulemaking, 14 FCC Rcd 152, ¶ 24 (1998) (“*First Report and Order*”).

³ See Petition for Rule Making by the Public Safety Wireless Network (“PSWN”) to Promote Allocation of Spectrum for Public Safety Agencies and Other Matters to Address Communications Needs Through 2010, filed September 14, 2001 (the “PSWN Petition”).

interoperability among police, fire, rescue and emergency management personnel, provide advanced video and data communications services, increase systems capacity for both life safety and public works uses, and improve communications reliability and redundancy.

There is also a critical need to implement an effective, long-term solution to the increasing levels of CMRS - public interference in the 800 MHz band. The CMRS industry and the public safety community, along with the FCC staff, have worked together over the past two years to identify the causes of this interference. These efforts have determined that the fundamental cause of the problem is the increasingly incompatible mix of mobile communications licensees in the 800 MHz band. Mitigating CMRS – public safety interference requires, among other things, realigning the 800 MHz Land Mobile Radio spectrum so that public safety and commercial services operate in separate contiguous spectrum blocks.

To achieve these essential public interest objectives, the Commission should immediately initiate a rulemaking proceeding with the goal of adopting the necessary rule changes within six months. This realignment plan will affect many users of this spectrum, including Specialized Mobile Radio systems (“SMR”), Business Radio and Industrial/Land Transportation Radio (“B/ILT”) systems and Public Safety Communications systems. It will also affect and substantially benefit Cellular Radio Telecommunications (“cellular”) systems. Although these actions will impose short-term costs on the affected parties, no private radio or commercial licensee will experience a net gain or loss in the amount of spectrum it currently holds. These parties will benefit in the long-term because they will be relieved of the burdens associated with ongoing coordination requirements, including operating restrictions and channel deployment limitations necessary to protect public safety communications systems from interference. Additionally, although it is not necessary to relocate cellular licensees in the upper portion of the

800 MHz band, 824/849 – 869/894 MHz, these licensees increasingly are the cause of CMRS – public safety interference and will need to undertake mitigation responsibilities to help achieve an effective, long-term solution to CMRS – public safety interference. The proposed realignment offers an equitable approach in which all involved categories of licensees would share the benefits and burdens in implementing a solution that enables public safety providers to serve the public more effectively and more reliably.

Public safety agencies are facing enormous challenges in light of the recent terrorist attacks on our nation. As PSWN has observed, the “tragic events of September 11, 2001 have underscored the need for public safety response and coordination on a massive, unprecedented scale.”⁴ Congress has recently emphasized the need to address this challenge,⁵ and the FCC has just announced the creation of a Homeland Security Policy Council composed of senior staff officials from throughout the Commission. The Council is charged with ensuring “that public safety, health and other emergency and defense personnel have effective communications available to them to assist the public as needed.”⁶ The actions recommended by this White Paper – realigning the 800 MHz Land Mobile Radio band and the allocation of an additional 10 MHz of readily useable spectrum for public safety services – will address these critical needs.

⁴ PSWN Petition at 4.

⁵ For instance, Senator James Jeffords of Vermont, Chairman of the Environment and Public Works Committee, recently introduced and then steered through his committee a bill (S. 1631) that would mandate a 90-day federal study of the “resources that are needed for development of an effective nationwide communications system for emergency response personnel.” The need for new resources was recognized even before September 11. On July 13, 2001, for instance, twelve members of the U.S. House of Representatives sent a letter to the Chairman and Ranking Member of the House Subcommittee on Commerce, Justice, State and Judiciary Appropriations requesting \$2 million to aid in the development of a county-wide interoperable public safety communications network for Los Angeles County.

⁶ “Federal Communications Commission Announces Creation of Homeland Security Policy Council,” released November 14, 2001.

II. EXECUTIVE SUMMARY

A. The Problem

This White Paper explains the reasons for the increasing incidence of CMRS – public safety interference in the 800 MHz band. Public safety and CMRS systems are operating essentially incompatible wireless system designs on adjacent, interleaved and mixed 800 MHz channels. The result is interference to public safety communications in the vicinity of CMRS base stations -- *even though all licensees are operating in compliance with the FCC's rules and the terms and conditions of their FCC licenses.* In addition, public safety communicators have an urgent need for additional spectrum in the near-term to support enhanced and improved communications to protect life, property and national security. This White Paper concludes that, to make additional spectrum available for Public Safety at 800 MHz and solve CMRS – public safety interference, some 800 MHz incumbents must move from their current channel assignments.

B. The Solution

The optimum solution is to realign the 36 MHz of 800 MHz public safety/CMRS spectrum by creating two separate (adjacent) contiguous channel blocks: 20 MHz to Public Safety (channels 1 – 400), and 16 MHz (channels 401 – 720) to commercial digital wireless networks. Public safety is currently allocated 9.5 MHz at 800 MHz; this proposal would more than double public safety's allocation to 20 MHz. To clear space for the public safety block, Nextel (the predominant incumbent commercial licensee with 18 MHz at 800 MHz) would relocate its licenses in channels 1 - 400 (8+ MHz of the total 20 MHz) to other spectrum at its own cost. Nextel will also contribute its 700 MHz Guard Band (4 MHz) and 900 MHz SMR licenses (4 of the 5 MHz SMR allocation at 900 MHz) to make spectrum available for relocating

800 MHz B/ILT incumbents and high-site (non-cellular) SMR incumbents from the new public safety block.

In return for the 16 MHz Nextel would contribute for these purposes, Nextel would be licensed replacement spectrum as follows: (1) 6 MHz at 821/824 – 866/869 MHz (the current NPSPAC channels) made available by consolidating and expanding the Public Safety spectrum in channels 1-400; and (2) a 10 MHz contiguous block from the reserve Mobile Satellite Service ("MSS") spectrum at 2.1 GHz, reallocated for terrestrial CMRS service and licensed to Nextel on a nationwide basis.

Incumbent B/ILT and non-cellular SMRs could remain at 800 MHz in the new public safety block on a secondary, non-interference basis where that arrangement is possible and desired by the parties, *i.e.*, tertiary and rural markets, or temporarily until public safety entities need the spectrum. The Commission should, however, create incentives for B/ILT and non-cellular SMRs to relocate expeditiously to the vacant 700 MHz or 900 MHz channels.

The 6 MHz of NPSPAC channels, in combination with the 10 MHz (816/821 - 861/866) already licensed for advanced technology SMR systems, would become a 16 MHz low power, low-site, digital SMR channel block. Nextel would move its operations in the new public safety block to this advanced SMR block, as would any other digital advanced SMR incumbent licensee in the new public safety block.

Nextel would commit to fund up to \$500 million of the costs of relocating incumbent 800 MHz public safety incumbents -- primarily from the NPSPAC channels to channels 1 – 400. Cellular operators should also contribute to public safety retuning costs, as should other CMRS licensees benefiting from the proposed 800 MHz realignment.

C. Public Interest Benefits

Realigning the 800 MHz band would rationalize the current spectrum hodgepodge that fundamentally causes CMRS – public safety interference, thereby creating the spectrum allocations that make it possible ultimately to virtually eliminate CMRS – public safety interference on a nationwide, long-term basis. It would more than double the public safety spectrum allocation at 800 MHz from 9.5 MHz of interleaved channels to 20 MHz of contiguous spectrum -- providing near-term spectrum relief in a band where equipment is readily available and that is adjacent to the future 700 MHz public safety channel block. No private or commercial licensee would experience a net gain or loss of spectrum, but all would be relieved of current interference-related burdens and have greater freedom to expand their networks in the future.

III. NEXTEL'S INTEREST IN THE REALIGNMENT PROPOSAL

As the predominant commercial licensee in the 800 MHz Land Mobile Radio band, Nextel holds numerous geographic area and site-by-site licenses that are adjacent to, interleaved with and mixed among public safety communications license assignments. Nextel is the fifth largest CMRS carrier in the nation, providing a unique combination of cellular, short messaging, internet access, data transmission and Direct Connect® -- a digital two-way radio feature that enables subscribers to reach other Nextel customers with the push of a button even if they are hundreds of miles away. As Nextel expands its network to provide enhanced coverage and increased capacity to serve its more than eight million customers, it finds itself unintentionally causing, along with other CMRS licensees, interference to public safety communications in a number of major metropolitan areas around the nation. Given its position as the primary

incumbent CMRS licensee in the Land Mobile Radio band, any realignment or consolidation of the 800 MHz public safety or commercial spectrum will require Nextel's cooperation.

Nextel submits this White Paper proposing a plan for 800 MHz realignment because it establishes the basis for an effective, long-term solution to CMRS – public safety interference. Nextel has expended significant staff and financial resources to mitigate interference to public safety communications on a case-by-case basis, including voluntarily agreeing to limit use of its licensed frequencies at certain sites, reducing power, reorienting antennas and similar measures. It has taken these actions voluntarily to safeguard the reliability of public safety communications, and thus the safety of emergency response personnel and the public they protect, even though Nextel is operating in full compliance with the FCC's rules and regulations.

Cellular licensees are also a source of interference to public safety systems and are finding it necessary to take similar actions to alleviate CMRS – public safety interference. As discussed herein, cellular A-band operators are causing interference to public safety communications in cities across the nation; in some cases, B-band cellular operators contribute to the interference. It is very difficult to coordinate the dynamic frequency reuse plans of multiple cellular-type commercial providers to protect nearby public safety communications systems from interference on a case-by-case basis.⁷ This approach imposes considerable burdens on all affected licensees and is limited in its effectiveness. Moreover, the burdens and difficulties of case-by-case remediation will only increase as all 800 MHz systems – both commercial and

⁷ In fact, as discussed *infra*, “mature” cellular systems use advanced dynamic frequency assignment algorithms that may not be able to account for CMRS – public safety interference. Even worse, cellular systems using advanced, digital broadband transmission technologies, such as CDMA, may not be able to eliminate specific channels that create interference.

public safety – evolve to meet expanding demand for enhanced wireless communications services.

For all of these reasons, Nextel proffers the proposed realignment plan as a means of alleviating CMRS – public safety interference by implementing a rational band plan for 800 MHz Land Mobile Radio use. This plan would correct the spectrum allocation and licensing practices that are at the root of the CMRS – public safety interference problem while providing growth opportunities for affected public safety, CMRS, B/ILT and high-site SMR systems. Nextel is also willing to contribute a substantial amount of spectrum as well as financial and human resources to the plan’s implementation. Nextel would gain no additional spectrum under the proposed realignment plan; in fact, Nextel would incur a net loss of approximately 0.5 MHz of spectrum. In exchange for the substantial contribution it is willing to make to the proposed plan, Nextel would be relieved of the burdens and risks involved in its current efforts to address CMRS - public safety interference. Nextel would also benefit by replacing its channel assignments in the 700 MHz, 800 MHz, and 900 MHz bands with two blocks of contiguous spectrum: 16 MHz at 800 MHz (of which Nextel is already licensed for a 10 MHz contiguous block) and 10 MHz at 2.1 GHz reallocated from the MSS band that has not been assigned to any MSS licensee.

IV. BACKGROUND

A. The Current 800 MHz Band Plan

Over the past 30 years, the Commission has allocated spectrum for and licensed a variety of wireless communications services at 800 MHz. Communications services in this band include public safety communications systems – the radio networks used by police, fire and rescue personnel – as well as other state and local governmental services. They include the private

systems licensed to businesses and industrial facilities to provide internal network wireless communications in and around manufacturing plants and for businesses. The 800 MHz spectrum is also home to commercial wireless providers, including the two cellular licensees in each local market and SMR licensees. These commercial providers compete, along with Personal Communications Service (“PCS”) providers, to offer Americans a variety of competitively priced wireless communications services that have become an essential part of contemporary life.

The current 800 MHz band plan dates back to 1974, when the Commission reallocated former UHF television channels 70 – 83, and 35 MHz of federal government spectrum, to Land Mobile Radio Systems.⁸ It earmarked 40 MHz of this spectrum for cellular systems, 30 MHz for conventional and trunked radio systems, and held the remainder in reserve.⁹ Under this technology-based allocation, applicants desiring to operate *conventional* land mobile radio systems could apply for channels from the 100 channel conventional service allocation, regardless of whether the applicant planned to provide communications support to public safety providers, a private network, or commercial wireless services to third parties.¹⁰ An applicant intending to operate *trunked* systems could apply for 5, 10, 15 or 20 channel groups from the upper 200 trunked channel allocation, again without regard to whether the applicant would use

⁸ See Exhibit A for a series of charts depicting the evolution of the 800 MHz Land Mobile Radio spectrum band plan from 1974 to the present. See also An Inquiry into the Future use of the Frequency Band 806-960 MHz, *Second Report and Order*, 46 FCC 2d 752 (1974) (“1974 Licensing Order”).

⁹ See *id.* at ¶¶ 12, 17. In a trunked system, two or more channels are linked with a computer that automatically assigns the first available channel to a user. In a conventional system, channel access is manually controlled and each user must search manually for a vacant channel. Conventional systems were simpler and cheaper to operate, but trunking is a more efficient technology because it allows a greater number of mobiles to be accommodated on the same number of channels.

¹⁰ See *id.* at 767-78, ¶¶ 45-48.

them in a private business network, offer for-profit commercial services, or dedicate its network to supporting police, fire, rescue and other public safety or public works services.

Given existing technological capabilities in 1974, system designers feared that the channels used in a multiple channel network would interfere with each other. Since 1974, therefore, the FCC's overriding concern in licensing 800 MHz land mobile trunked systems (and in assigning additional channels to conventional systems) has been to prevent interference between providers or users of the same communications service ("intrasystem interference") by assigning channels one megahertz apart, rather than assigning contiguous channels.¹¹ Until recently, the Commission believed that interference between providers or users of different communications services ("intersystem interference") would not be a problem in its 800 MHz spectrum allocation and channel assignment decisions.¹²

As a result, 800 MHz commercial land mobile radio licenses are not contained in discrete, separate blocks or sub-bands, as is the case for cellular and PCS licensees, but are spread almost randomly throughout the land mobile band, separated only by co-channel base station distance requirements. Public safety, B/ILT and commercial providers are interleaved, mixed and adjacent to each other creating a hodgepodge of different types of service providers – sometimes sharing the same channels (but separated by specified co-channel distances), and sometimes using adjacent channels. The fact that the cellular allocation is adjacent to the NPSPAC channels creates an even more complicated mix of spectrum uses and technologies and further exacerbates the potential for interference. This situation posed no apparent problems

¹¹ For example, a five-channel trunked system would be assigned channels 401, 441, 481, 521 and 561. This exacerbated the scrambling of different licensees on adjacent, near-adjacent and even the same channels (with specified co-channel separation) throughout the 806/821 – 851/866 MHz portion of the 800 MHz band.

¹² See *1974 Licensing Order* at 772-73, ¶¶ 71-73.

when all licensees were using the same technology; *i.e.*, a few high-power, high-site transmitters serving an entire metropolitan area. CMRS licensees, however, have now adopted more efficient system architectures that employ multiple base stations and frequency reuse techniques to achieve the network capacity to meet growing consumer demand for their services. As described in section V.A. below, the use of these differing system architectures in the 800 MHz band has created locally disparate signal strengths that, under certain circumstances, cause interference to public safety communications systems.

B. CMRS-Public Safety Interference in the 800 MHz Band

In the past few years, there have been numerous reports regarding CMRS - public safety interference in the 800 MHz band in municipalities across the country. In a typical incident, a police officer or firefighter finds that his or her mobile radio does not work well – or at all – in areas near CMRS base stations where communications had previously been satisfactory.¹³ Interference to public safety radios raises serious public interest concerns, as public safety officials use these radios to provide communications supporting life safety services, such as police, fire and rescue services, as well as other governmental functions including road maintenance, trash collection, security services, traffic management, snow removal and similar public works services.

CMRS – public safety interference has been reported in about 25 cities throughout the nation including Seattle, Washington; Miami, Florida; Hialeah, Florida; Orange County, California; Phoenix, Arizona; Baltimore, Maryland; and Salt Lake City, Utah. These reports are becoming more frequent with the increased buildout of commercial wireless networks that use advanced cellular-type, multiple base station architecture to place a strong localized signal “on

¹³ The area of interference can be as small as a few feet to as much as one-quarter of a mile from the commercial operator’s base station site.

the ground” relative to the signal strength found in public safety networks using one or a few distant base stations to cover a large area. These factors create conditions in which interference is likely, despite the fact that all affected parties are operating their communications systems in full compliance with the Commission’s rules and the parameters of their FCC licenses. In some cases, a commercial SMR operator such as Nextel is the sole source or a contributing source of interference to public safety systems. A cellular operator can be the sole source of CMRS – public safety interference, and cellular operators can combine with each other or with commercial SMR operators to cause interference -- particularly when using co-located base station sites.

For example, officers of the City of Denver Police Department experienced disruptive interference on their 800 MHz mobile communications system in the immediate vicinity of approximately 20 Nextel base stations – largely due to intermodulation products formed in the officers’ radios – even though Nextel was operating in full compliance with the Commission’s rules. Interference has disrupted police communications in the vicinity of co-located Nextel and AT&T Wireless (the cellular A-band licensee) base stations in the nearby cities of Cherry Hills and Westminster, Colorado. The Maui, Hawaii Police Department reported that its officers’ handsets and mobile units were experiencing interference at a heavily-trafficked shopping center near the co-located base stations of the cellular A band licensee, AT&T Wireless, and Nextel Partners.¹⁴ The interference resulted primarily from AT&T Wireless’s operations on frequencies adjacent to the channels licensed to the police communications system, with a secondary contribution from Nextel Partners’ co-located transmissions.

¹⁴ Nextel Partners, Inc. ("Nextel Partners") is a partially-owned affiliate of Nextel, which provides 800 MHz iDEN digital services in 100 secondary and tertiary markets throughout the

In Oregon, the City of Portland and the Washington County Consolidated Communications Agency (“WCCCA”) identified interference in the immediate vicinity of a number of Nextel base stations. Working together, WCCCA and Nextel engineers have resolved most of these situations; however, as WCCCA expands its communications network geographically into adjacent counties and into the NPSPAC channels – to meet increasing demand and coverage requirements – adjacent A-band cellular operations are causing interference. The City of Portland is also experiencing interference in the vicinity of CMRS base stations, including the cellular A band carrier and Nextel – both alone and in combination. Similarly, police, fire and emergency medical services personnel in Anne Arundel County, Maryland have reported interference to mobile communications in the vicinity of co-located cellular (here Cingular and Verizon) and/or Nextel base stations. As the County considers technical specifications for a replacement radio system, it is asking all in-band carriers to participate in a channel coordination effort for controlling interference to its public safety radio system.¹⁵ The County is also asking Nextel to work with it on a possible channel swap to alleviate the continuing interference. Such a swap could be a localized version of the realignment proposal set forth herein.

C. Efforts to Address CMRS - Public Safety Interference in the 800 MHz Band

The Commission began receiving inquiries and complaints about CMRS – public safety interference in 1999. In April 2000, it brought together affected parties in response to increased reports of interference to 800 MHz public safety radio networks apparently resulting from the

United States. Nextel Partners utilizes the same mix of 800 MHz spectrum and faces the same potential interference issues that Nextel does in the 800 MHz band.

¹⁵ See Letter, dated October 30, 2001, from Spurgeon R. Eismeier, Sr., Central Services Officer, Anne Arundel County, to Lawrence R. Krevor, Nextel Communications, Inc.

operations of nearby commercial systems, even though all providers were operating within the parameters of their FCC licenses. A number of participants formed a working group to identify the causes of the interference, identify mitigation alternatives, and develop joint planning and technical solutions for preventing interference.¹⁶

On January 4, 2001, the group presented to the Wireless Telecommunications Bureau (the “Wireless Bureau”) a “Best Practices Guide” that provides a broad overview of practices that can be used to identify and alleviate interference between public safety systems and commercial systems.¹⁷ The Best Practices Guide offers strategies that can mitigate interference through frequency planning, strategic location of public safety and commercial base stations, system design improvements for commercial and/or public safety networks, equipment upgrades, frequency swaps, and, if necessary, FCC rule changes or waivers. Subsequently, the Association of Public Safety Communications Officials, International (“APCO”) established an initiative called Project 39 to further the goals of the Best Practices Guide. APCO Project 39 membership includes persons representing the public safety community, manufacturers and commercial operators as well as the National League of Cities, the National Association of Counties, and the associations representing police and fire chiefs. The Wireless Telecommunications Bureau named the Deputy Chief for Public Safety of the Bureau’s Public Safety and Private Wireless Division as the FCC’s liaison to Project 39.¹⁸

¹⁶ The group included Motorola, Inc., the Association of Public Safety Communications Officials International (“APCO”), PSWN, CTIA, and Nextel.

¹⁷ See *FCC Press Release*, Wireless Telecommunications Bureau Announces Best Practices Guide for Avoiding Interference Between Public Safety and Commercial Wireless 800 MHz Communications Systems (issued February 9, 2001).

¹⁸ See Letter from D’wana R. Terry, Chief, Public Safety and Private Wireless Division, to Mr. Joe Kurran, Washington County Consolidated Communications Agency, dated September 13, 2001.

Notwithstanding these efforts, reports of CMRS – public safety interference continue. Disruptive interference has been reported recently in the vicinity of four CMRS sites in the Las Vegas area, at additional sites in south Florida, and at sites in the Greater Los Angeles area. These reports illustrate the continuing nature of this problem and indicate that additional instances of CMRS – public safety interference will occur unless the FCC takes effective remedial action to address and correct the underlying causes of this problem.

V. THE CAUSES OF CMRS – PUBLIC SAFETY INTERFERENCE AND THE PUBLIC SAFETY COMMUNITY'S NEED FOR ADDITIONAL SPECTRUM

One of Congress’s overriding objectives in establishing the FCC was “ to make available, so far as possible, to all the people of the United States, . . . a rapid, efficient, nationwide and world-wide wire and radio communication services . . . for the purpose of promoting safety of life and property through the use of wire and radio communication.”¹⁹ Consistent with this vital objective, the FCC is responsible for devising an effective, long-term solution to the problem of CMRS – public safety interference in the 800 MHz band, and for acting on requests to allocate additional spectrum for public safety communications. Specifically, the Commission should: (1) recognize that the current spectrum allocation and spectrum licensing structure of the 800 MHz band is the fundamental cause of CMRS – public safety interference in this band; (2) correct this problem by, among other things, realigning the 36 MHz of land mobile radio spectrum at 806/824 – 851/869 MHz so that public safety, private radio, and CMRS are no longer commingled; and (3) allocate an additional 10 MHz of near-term available spectrum at 800 MHz for public safety communications.

¹⁹ 47 U.S.C. § 151.

A. The Mixed Licensing of Public Safety, Private and Commercial Systems Throughout the 800 MHz Band is the Fundamental Cause of CMRS – Public Safety Interference

The potential for CMRS – public safety interference in a specific area is, of course, influenced by the particular facts and circumstances of each local situation.²⁰ As noted above, there are two basic underlying causes of this interference: (1) the interleaved and mixed allocation of public safety, private radio, and CMRS systems at 800 MHz, and (2) the different architectures these systems have come to use. Realigning the 800 MHz band would directly address these two factors and make it possible to rectify CMRS - public safety interference in the 800 MHz band.

Interleaved and Mixed Spectrum Allocations and Licensing. One of the two fundamental causes of CMRS – public safety interference is the shared, mixed and interleaved allocation and licensing of commercial, private and public safety systems throughout the 800 MHz band. Because public safety channels are interleaved among and adjacent to CMRS and B/ILT channels, and because public safety licensees can be found throughout the 806/824 – 851/869 MHz band, public safety radios must be able to transmit and receive on any of these channels so that they can be used on any public safety system.²¹ The Land Mobile Radio spectrum allocation is so intermixed that it is technically impractical to build receivers that respond only to those channels licensed to a particular system. Thus, the allocation of spectrum for public safety uses

²⁰ In general, the magnitude of the disparity between public safety and commercial signal levels, the number of channels being used by each operator, the height and power of the affected stations, the degree of antenna downtilt and local topographic and propagation characteristics can all affect whether interference occurs. Moreover, some models of public safety receivers exhibit sub-optimal intermodulation, adjacent channel and spurious-response rejection capabilities, thereby increasing the potential for CMRS - public safety interference.

²¹ It would be significantly more expensive to build different receivers for the interleaved 70 public safety channels only, or for the NPSPAC channels only, thereby increasing

at different places in the band and the actual licensing of public safety communications systems throughout the 800 MHz band make it impossible to design receivers that will “hear” only public safety transmissions and filter out other systems’ signals within the band.²²

Moreover, equipment designers must also take into account the thermal “drift” of bandpass or preselector filters in response to ambient temperature changes. As the temperature varies, the range of frequencies that pass through the receiver’s front end shifts up and down; the filters must therefore pass an even wider range of channels to ensure that the receiver “hears” the desired channels. Most public safety receivers “hear” and respond to RF energy in the adjacent 824/849 – 869/894 MHz cellular band with minimal signal strength attenuation, as well as in the 806/824 – 851/869 MHz land mobile channels. The broad frequency response of public safety receiver equipment permits multiple RF emissions from SMR transmitters, cellular transmitters, or mixtures of both to combine in a public safety receiver and produce interference.

Diverging System Architectures. The Commission’s approach of allocating and licensing different services on adjacent, interleaved, and mixed spectrum in the 800 MHz band worked so long as all licensees built systems using the same basic “noise-limited” design architecture: analog, high-site, high power configurations without frequency reuse.²³ Over the past decade,

infrastructure costs for publicly funded systems. It would also prevent a single system from using both lower 70 and NPSPAC channels, unless the user carried two separate handsets.

²² Public safety handsets are able to receive and transmit on General Category channels, the lower 80 interleaved SMR channels, and the upper 200 SMR channels as well as the 70 interleaved public safety channels and NPSPAC channels, because public safety systems were licensed in the past on all of these channels.

²³ As discussed above, Public Safety communications systems have traditionally been designed to enable communications at low signal levels (as low as –105 dBm or less) until the desired signal cannot be distinguished from the background thermal noise in the receiver. This design enables public safety agencies to provide coverage throughout their jurisdictions – often large geographic areas -- with one or at most a few base stations (using simulcast rather than frequency reuse design) -- and therefore minimal expenditure of public funds.

however, commercial land mobile systems have transitioned to “interference-limited” system designs featuring multiple, low-power base stations with intensive frequency reuse and mobile hand-off from cell-to-cell throughout a geographic area to serve many times more users with the same quantity of spectrum.²⁴ At the same time, cellular operators licensed above 869 MHz adjacent to the NPSPAC channels have expanded the capacity and coverage of their “interference-limited” systems. By introducing digital modulation technologies and numerous low sites, these cellular operators more intensively reuse their spectrum to meet the substantial growth in demand for commercial wireless services.

These differing system architectures can result in locally robust CMRS signals being much stronger than distant, less robust, public safety transmissions,²⁵ particularly within a few hundred meters of the CMRS base station where the commercial signal is strongest.²⁶ This disparity in signal strength leads to three types of interference:

(1) *Intermodulation*. Intermodulation (“IM”) is the primary interference mechanism involved in CMRS – public safety interference. It occurs when locally stronger CMRS signals, on non-public safety frequencies, combine in the public safety receiver itself to form a new frequency or frequencies, much like combining red and yellow paint produces a new color -- orange.²⁷

²⁴ Interference-limited systems use multiple, low power base stations and sophisticated frequency coordination to control intrasystem interference while maximizing user capacity.

²⁵ Signal levels immediately around low-height CMRS sites are typically much stronger (e.g., -25 to -40 dBm) than those from more distant high-height public safety transmitters (e.g., -70 to -100 dBm or less).

²⁶ In the earlier days of cellular development, this happened infrequently because cellular antennas were located at high enough elevations that the distance to the ground sufficiently attenuated the signals so that they rarely “overpowered” adjacent public safety signals. As cellular use has grown, cellular carriers are building smaller cells with lower sites to maximize frequency reuse; the lower antennas produce a stronger signal at ground level.

²⁷ As an example, a commercial SMR signal at 864 MHz can combine with a cellular A-band signal at 870 MHz to produce intermodulation products at 858 MHz and at 876 MHz. The 876 MHz product falls in the cellular A-band and therefore is not germane to this discussion; however, the 858 MHz signal falls in the 851-869 MHz band and could be licensed to a public safety system. If the public safety system is operating on 858 MHz, and if the SMR and cellular

(2) *Wideband noise interference.* The large signal strength disparity between typical high-site public safety and low-site commercial systems means that wideband noise produced by the commercial systems, while fully within FCC limits, may still be strong enough to cause interference to the relatively weak signals produced by the public safety radio system, particularly if those signals are close to the thermal noise limit of the public safety receivers.²⁸

(3) *Receiver Overload Interference.* If a commercial SMR or cellular operator has a large number of transmitters at a given site (to serve user demand), a public safety radio designed to receive very weak signals may be overloaded by the cumulative energy coming from the nearby site.

It warrants reemphasizing that the incidents of CMRS – public safety interference in the 800 MHz band reported to date have *not* resulted from the failure of any party to comply with Commission rules or the parameters set forth in its license. Rather, such interference results from the normal operation of systems designed and optimized to meet the different needs of public safety and commercial communications systems licensed on adjacent, interleaved and shared channels. “Noise-limited” public safety system designs have been a satisfactory model for public safety deployments given that public safety operators, spending public funds, must cover large geographic areas as economically as possible. CMRS providers, in contrast, have acted rationally in response to marketplace demand by making substantial investments in digital, frequency reuse technologies to meet the dramatically increasing consumer demand for their wireless communications services.²⁹

A-band providers are colocated on a tower or building in its service area, the public safety mobile and portable units could experience interference in the immediate vicinity of the colocated CMRS site due to the relatively strong signals from the commercial SMR and cellular A-band operator creating intermodulation interference in the public safety receiver.

²⁸ Wideband noise interference usually becomes visible only after intermodulation interference is eliminated. It should be noted that commercial SMR and cellular operators are not the only contributors to a higher noise floor. Other RF sources, such as “active” television reception systems, cellular antennae flashing light displays, and computer RF emissions also increase the noise floor and can interfere with public safety communications.

²⁹ For example, in 1990, 19 MHz of SMR spectrum was exhausted in most major markets despite serving only about one million users. The subsequent evolution of SMRs to digital,

B. 800 MHz Realignment Will Create the Spectrum Allocations Necessary to Mitigate CMRS – Public Safety Interference

The ability of law enforcement, fire departments, and other public safety agencies to communicate effectively and without harmful interference is critical to the safety of life and property and our nation's security. The public safety community and the CMRS industry have worked to address these problems through the Best Practices Guide and Project 39, and these parties should be commended for undertaking these initiatives. These efforts, while a positive step, are nonetheless *ad hoc* and time consuming and impose significant burdens on all parties.

Incident-by-incident, after-the-fact interference remediation will inevitably fail to protect fully the safety of law enforcement personnel, firefighters and other emergency responders, and fail to keep pace with the evolving communications needs of both public safety and commercial communications providers. CMRS – public safety interference is likely to worsen in the coming years unless a long-term solution is adopted. CMRS carriers continue to expand their systems to serve additional users on existing spectrum and to meet the growing demand for competitive commercial wireless communications, including high speed data and other advanced services. Public safety communicators, despite limited funding and network infrastructure, must provide expanded communications coverage – particularly in-building coverage – as well as data and other enhanced capabilities to support life safety services in growing cities and suburbs. These realities will increasingly juxtapose locally robust CMRS deployments with public safety

cellular-like, frequency reuse technology dramatically increased their capacity enabling the same 19 MHz to support more than eight million users – an eightfold capacity increase over the 1994 industry total. See *Industrial Communications*, October 13, 1989; Implementation of Section 6002(B) of the Omnibus Budget Reconciliation Act of 1993: Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, *First Report*, 10 FCC Rcd. 8844, 8855-57 ¶¶ 35-39 (1995) (“*First Competition Report*”).

communications systems operating with relatively weak signals – a recipe for increased CMRS - public safety communications interference under the current 800 MHz band plan.

Given these risk factors, the Commission must use its regulatory authority to implement a long-term solution that corrects the underlying cause of 800 MHz CMRS – public safety interference by realigning the 36 MHz of Land Mobile Radio spectrum in the 806/824 – 851/869 MHz band to separate public safety channels and commercial channels into exclusive, contiguous blocks. As discussed further in section VI.B., below, the Commission and the public safety community must consider additional measures to safeguard against CMRS - public safety interference, including a possible guard band and the reduction of public safety receiver sensitivity outside the public safety channel block.

These actions would eliminate the underlying bases for CMRS – public safety interference and provide a near-universal solution. Unless the Commission mandates 800 MHz realignment and the associated interference-prevention measures discussed below, public safety operators will face the ongoing challenge of case-by-case interference identification and analysis, as well as trial and error corrections every time a nearby commercial carrier modifies its inherently dynamic network. Even with close cooperation among all parties, the ongoing burden of this process and continued threat of impaired public safety communications, not to mention the spectral constraints it imposes on commercial carriers, warrants the cost and effort necessary to implement the ubiquitous, permanent solution described herein.

The same considerations that call for a realignment of the 800 MHz Land Mobile Radio band shaped the band plan the FCC adopted for future public safety and CMRS systems that will operate in the 700 MHz band spectrum reallocated from broadcast television service on UHF Channels 60-69. The Balanced Budget Act of 1997 directed the Commission to reallocate 24

MHz of this spectrum for public safety use and 36 MHz of this spectrum for commercial use.³⁰ Instead of interleaving commercial and public safety channels in this spectrum, the Commission has designated contiguous spectrum blocks (channels 60-62 and 65-67) for exclusive commercial use, and separate contiguous spectrum blocks (channels 63-64 and 68-69) for exclusive public safety use. In addition, the Commission established guard bands in the commercial spectrum immediately adjacent to the public safety bands and prohibited commercial licensees in these bands from employing cellular architectures.³¹ The FCC adopted these measures in response to concerns that commercial, interference-limited systems could not co-exist adjacent to noise-limited public safety systems without interference.³² These same concerns warrant 800 MHz Land Mobile Radio band realignment.

C. The Public Safety Community Needs Additional Spectrum for Communications Services

As part of realigning the 36 MHz of Land Mobile Radio spectrum in the 806/824 – 851/869 MHz band, the Commission should allocate additional spectrum for public safety services by creating a 20 MHz contiguous, primary public safety channel block in the 806/816 – 851/861 MHz band. This proposal would more than double, from 9.5 MHz to 20 MHz, the public safety spectrum at 800 MHz.

There is a pressing need to allocate additional spectrum for public safety communications. In 1996, the Public Safety Wireless Advisory Committee (“PSWAC”) issued a report that, among other things, recommended that the FCC allocate 97.5 MHz of additional

³⁰ 47 U.S.C. § 337(a).

³¹ See *In the Matter of Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission’s Rules, Second Report and Order*, 15 FCC Rcd 5299 (2000).

³² *Id.* at ¶ 12.

spectrum for public safety services to meet the current and foreseeable requirements for wireless communications through the year 2010.³³ The Commission took an important step towards meeting these requirements in 1997 when, as described above, it reallocated 24 MHz of spectrum from television channels 60 – 69 for public safety use in the 700 MHz band and subsequently established a band plan and service rules for that spectrum allocation.³⁴ Due, however, to current television broadcaster incumbency, public safety communications providers in most parts of the nation cannot yet access this spectrum, and may continue to be foreclosed from deploying service there for many more years.³⁵ This uncertainty has, in turn, hindered the development of 700 MHz public safety communications equipment. Thus, while 700 MHz may offer a partial long-term solution to the spectrum needs of public safety communications, it does not provide short-term or even medium-term relief.

As noted above, on September 14, 2001, PSWN filed a petition for rulemaking reiterating the urgent need to allocate an additional 71 MHz of spectrum to meet public safety needs, and described the delays encountered in deploying public safety services in the 700 MHz band.³⁶ PSWN states that, “the greatest spectrum need of public safety wireless communications is for bandwidth to support low-speed data, high-speed data, and video. These capabilities,

³³ PSWAC Final Report, September 11, 1996.

³⁴ *First Report and Order* at ¶ 2, citing Report and Order, ET Docket No. 97-157, 12 FCC Rcd 22, 953 (1997).

³⁵ Analog broadcast television stations, including those operating in the 700 MHz band (UHF Channels 60-69) are permitted by statute to continue operations until their markets are converted to digital television, which is not scheduled to occur until at least December 31, 2006. See 47 U.S.C. § 337(e). The Commission must extend this date in certain circumstances, including the lack of significant penetration of digital television within a market. See *id.* at § 309(j)(14). See also *In the Matter of Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission’s Rules*, Order on Reconsideration of the Third Report and Order, WT Docket No. 99-168, FCC 01-258 (released Sept. 17, 2001) (adopting initiatives to expedite the clearance of broadcast television operations in UHF Channels 60-69).

incorporating the latest technologies, would allow local law enforcement, fire, and emergency management service personnel to employ the quickest and most informed approach in performing their duties.”³⁷ The petition also “reassert[ed] the urgent need for additional interoperability spectrum to be allocated for use by public safety agencies in all bands.”³⁸ According to PSWN, such an allocation “is important primarily because of the emergence of new, innovative, life-saving technologies that will likely require greater bandwidth to function optimally.”³⁹

The compelling necessity of 800 MHz realignment to combat CMRS – public safety interference provides the FCC with a unique opportunity to allocate additional spectrum for public safety communications systems in a band where equipment is already available. Consequently, the Commission should reallocate 10.5 MHz of 800 MHz SMR spectrum for public safety use to be consolidated and realigned on a contiguous basis with the existing 9.5 MHz of public safety spectrum at 800 MHz. Equipment is readily available for public safety use on 800 MHz spectrum,⁴⁰ and relocating SMR (and many B/ILT) incumbents from this spectrum can be achieved in a relatively short timeframe – as short as two to three years and certainly before relocation of incumbent broadcasters out of the 700 MHz public safety channels can be

³⁶ *Supra.* at p. 3 and n. 3.

³⁷ PSWN Petition at 10.

³⁸ *Id.* at 15.

³⁹ *Id.* at 14.

⁴⁰ Equipment meeting the specialized public safety needs of the APCO 25 standard is already available for 800 MHz use and is well along in development for adjacent 700 MHz channels. In short, expanding the amount of exclusive, contiguous public safety spectrum at 800 MHz adjacent to the new 700 MHz public safety allocation is a far more effective and efficient long term plan than establishing additional public safety spectrum in another band, particularly in the higher bands with propagation characteristics requiring more infrastructure to meet ubiquitous public safety coverage requirements.

completed.⁴¹ This reallocation will help meet the public safety community’s urgent need for additional spectrum to accommodate data applications as well as critical interoperability needs. It will also provide public safety communications a larger contiguous block of spectrum in the 800 MHz band that is directly adjacent to the 700 MHz spectrum that has been reallocated for exclusive public safety use. This additional spectrum will provide the basic spectral resource for the development of advanced communications capabilities to support both Homeland Security and “everyday” public safety services in the post-September 11 environment.

VI. PROMOTING PUBLIC SAFETY BY REALIGNING THE 800 MHZ BAND AND ALLOCATING ADDITIONAL SPECTRUM TO PUBLIC SAFETY COMMUNICATIONS

A. The Realignment Plan

This White Paper has described two vital steps to promote public safety communications: mitigating current and future CMRS – public safety interference, and providing public safety licensees with additional, useable spectrum as quickly as possible. To accomplish these steps, the Commission should implement the following spectrum reallocations and redesignations, and the subsequent mandatory relocation and voluntary relocation of various incumbent licensees:⁴²

- (1) Reallocate the 800 MHz General Category and interleaved SMR, B/ILT and public safety channels, 800 MHz channels 1 – 400 (806/816 – 851/861 MHz), to create a 20 MHz contiguous, primary Public Safety spectrum block.

⁴¹ This reallocation plan takes into account Nextel’s consolidation over the past decade of the majority of commercially-available 800 MHz land mobile radio spectrum. The fact that one CMRS licensee in this band, Nextel, holds many of the EA licenses and site-by-site licenses on the proposed new 20 MHz public safety block at 800 MHz, significantly simplifies the incumbent retuning and relocations necessary to effectuate an 800 MHz Land Mobile Service band realignment.

⁴² See Exhibit B for a chart depicting the proposed new 800 MHz Land Mobile Radio band plan, and a chart depicting all of the reallocations and redesignations necessary to carry out the proposed realignment.

- (2) Reallocate the 6 MHz of public safety NPSPAC channels (821/824 – 866/869) and the adjacent 10 MHz of upper 200 SMR channels (816/821 – 861/866) for advanced technology commercial wireless systems using “interference-limited” multiple low-site, low-power systems architecture. The Commission should license the additional 6 MHz to Nextel in partial exchange for the spectrum it will vacate and swap to help implement 800 MHz realignment; Nextel is already the dominant incumbent licensee on the adjacent 10 MHz.
- (3) Reallocate 10 MHz of contiguous spectrum (2020/2025 – 2170/2175) from MSS for exclusive terrestrial advanced commercial mobile communications services. This block is currently not being used by any MSS licensee, but includes non-MSS Broadcast Auxiliary Service incumbents that must be relocated to enable advanced mobile communications services to use this band, as detailed in section VIII.B. below. The Commission should license this 10 MHz to Nextel as part of this proceeding in an even exchange for certain of its licenses totaling 10 MHz of spectrum in the 700, 800 and 900 MHz bands to make the 800 MHz band realignment possible.
- (4) Redesignate 4 MHz of the 5 MHz of SMR spectrum at 900 MHz (896/901 – 934-940), currently licensed to Nextel, for traditional (noise-limited) co-primary B/ILT and high-site SMR use.⁴³
- (5) Redesignate the 50 Business and 50 I/LT channels between 809.75/816 – 854.75/861 MHz from primary B/ILT to primary public safety use as part of the channels 1 – 400 public safety block. Incumbent B/ILT licensees would be permitted to remain on these channels on a secondary, non-interference basis or voluntarily relocate as described below.⁴⁴
- (6) Redesignate the 4 MHz of 700 MHz Guard Band spectrum (762/764 – 792/794 MHz) from Guard Band Manager to co-primary B/ILT and high-site, analog SMR use, and modify the current service rules that apply to this spectrum to achieve this objective.
- (7) Expedite the current schedule for mandatory retuning of all Broadcast Auxiliary Service incumbents at 2020 - 2025 MHz, and, to the extent necessary, terrestrial Fixed Point-to-Point Microwave systems at 2170 – 2175.

⁴³ A total of five MHz of this 10 MHz block is currently allocated for SMR use with the remaining five MHz allocated for B/ILT use. The SMR and B/ILT channels are allocated on an alternating, interleaved basis. Because all licensees will initially be using comparable noise-limited system architecture, this interleaved spectrum does not pose an interference risk. To the extent that these licensees desire to migrate eventually to interference-limited systems, the Frequency Coordinators for 900 MHz can assign these channels to separate such uses.

⁴⁴ Any B/ILT licensees remaining on these channels after a voluntary relocation period would have secondary status only, *i.e.*, they may not interfere with public safety communications and must accept any interference resulting from the primary public safety operations.

- (8) Require mandatory retuning of all advanced technology (interference-limited) CMRS SMR systems from the new 800 MHz Public Safety Block (800 MHz channels 1 through 400) to the 16 MHz advanced technology block at 800 MHz.
- (9) Require mandatory retuning of all public safety licensees in the NPSPAC channels, 821/824 – 866/869 MHz, to the new 806 MHz Public Safety channels through the assistance of a Special Public Safety Frequency Coordinator, as detailed below. This mandatory retuning of public safety systems would be funded in large part by Nextel, any other advanced technology SMR licensee, and the cellular licensees.
- (10) Permit voluntary retuning of B/ILT incumbents and noise-limited SMR incumbents to the new 900 MHz B/ILT and traditional SMR spectrum, or to the 700 MHz former guard band channels, with the assistance of Frequency Coordinators on a first-come, first-served basis.⁴⁵

At the end of the relocation period, all users would be grouped together in discrete parts of the band depending on their technology choices. No private radio or commercial licensee would experience a net gain or loss of spectrum, and all licensees would have the opportunity to gain increased spectrum efficiency because of the new contiguous and near-contiguous spectrum grants. To facilitate this realignment plan, the Commission should waive applicable FCC fees associated with the relocation and other license modification applications that would need to be filed by incumbent licensees under this plan.⁴⁶

This 800 MHz realignment plan offers the most expeditious and efficient path to eliminating CMRS – public safety interference. Nextel has evaluated other realignment alternatives, including separating public safety, B/ILT and commercial/advanced SMR licensees into separate blocks within the 800 MHz band; requiring the immediate refitting or replacement of all public safety receivers to achieve higher IM rejection specifications; moving all 800 public

⁴⁵ The Commission should establish a filing window for first-come, first-served incumbent relocation applications to encourage these incumbent licensees to migrate to the largely vacant 900 MHz current SMR spectrum or the 700 MHz spectrum.

⁴⁶ See 47 U.S.C. § 158(d)(2) (FCC may waive payment of an application fee "for good cause shown, where such action would promote the public interest").

safety systems to 700 MHz or to 900 MHz; requiring CMRS and public safety licensees to mitigate interference on a case-by-case basis much as they have been doing to date; and requiring extensive and careful frequency coordination between CMRS providers and public safety communications systems. None of these alternatives effectively achieves the essential public interest objective of correcting the fundamental cause of CMRS – public safety interference at 800 MHz while making a significant amount of near-term spectrum available for enhanced and expanded public safety communications networks.⁴⁷

B. Additional Measures To Prevent CMRS – Public Safety Interference

The realignment of the 800 MHz Land Mobile Service spectrum band is an essential step toward eliminating harmful CMRS – public safety interference in this band. Realignment alone, however, will not completely eliminate this interference because public safety radios may still respond to RF energy from the adjacent digital SMR and cellular bands. This section discusses a number of potential solutions to this problem. The Commission could by rule adopt any of these specific alternatives or instead authorize public safety frequency coordinators to implement them in whole or in combination as warranted on a regional, metropolitan area, or other geographic basis.

⁴⁷ For example, while it has been possible to undertake “careful frequency coordination” in some cases, it is increasingly difficult to do so in the current environment as the result of two trends. First, local jurisdictions have become increasingly interested in requiring CMRS operators to collocate on the same transmission towers. This collocation has led to increased combinations of signals by commercial operators and thus increased interference to public safety communications. Second, CMRS operators are now deploying automated frequency use algorithms to maximize the moment-by-moment efficiency of their spectrum use. This development makes it more difficult to account for a particular public safety system through frequency coordination, particularly if multiple CMRS systems each employing automated assignment programs need to be coordinated. Given both these trends, frequency coordination is impractical at best when CMRS channel use restrictions are required to avoid IM interference with public safety frequencies, particularly when multiple CMRS carriers are involved.

Improved Receivers. One means of reducing CMRS - public safety interference is to improve public safety receivers. Realigning the 800 MHz band to eliminate interleaved mixed spectrum should enable equipment manufacturers to design narrower band-pass preselector filters and/or receiver signal attenuation characteristics that would in most cases prevent commercial transmissions from forming intermodulation products in public safety receivers. Narrower filters could limit receiver sensitivity to the new public safety channel block; if the receiver did not respond (or had a much smaller response) to signals outside the public-safety band, it would not be susceptible to intermodulation interference. Alternatively, if such filters were too costly, required too much space in the receiver or imposed undesirable performance tradeoffs, manufacturers could couple a somewhat less restrictive preselector with a fixed or variable attenuator to combat intermodulation. Digital SMR, cellular and PCS receivers already use this type of automatic attenuation capability to control potential intermodulation interference.

Based on analysis of CMRS – public safety interference in several cities as well as current receiver performance specifications and characteristics, it is recommended that the Commission adopt the following performance standards for 800 MHz public safety and CMRS systems to prevent harmful interference between these systems:

- Public-safety mobile or portable receivers should be able to receive the desired public safety signal in the presence of commercial signals having a composite average power of –10 dBm, a peak-to-average ratio of 15 dB, and a noise output that conforms to the FCC requirements for transmitters in the band.
- In accordance with the licensee relocation schedule discussed in section VI.F. below, all public-safety receivers should meet or exceed the following performance standards by the end of the mandatory relocation period specified for a given EA:

Item	Requirement
Intermodulation rejection	75 dB or better
Front-end filtering	The receiver should incorporate filters ahead of the first active stage such that commercial signals outside the public-safety range are attenuated no less than 20 dB more than any attenuation provided to signals in the public-safety range. This filtering should take place under all operating conditions.
Adjacent-channel rejection	75 dB or better
Reference sensitivity	< -112 dBm

Additional CMRS Base Station Filtering. In addition to receiver standards, the Commission should require additional filtering of CMRS base station transmitters to further reduce wideband noise from CMRS transmitters falling in the public-safety band. Specifically, all commercial transmitters in the 851- 894 MHz band could be required to attenuate energy in the public-safety band no less than 85 dB below the desired carrier level.

Guard Band/Advanced Technology Band. In order to allow public-safety receiver preselectors and CMRS base station transmitters to filter out signals not in the appropriate band, some spectrum isolation between CMRS and public-safety systems is necessary. One way to achieve this is for public safety coordinators to implement a guard band on the upper end of the base-to-mobile frequency in the 20 MHz public safety block.⁴⁸ Requiring a guard band would be consistent with the band plan adopted by the Commission in allocating spectrum for CMRS and public safety use at 700 MHz. A 2 MHz minimum guard band likely would be required to allow filters in public-safety receivers and CMRS base-station transmitters to function effectively. The Commission should evaluate further whether 2 MHz is sufficient or whether a larger guard band

⁴⁸ A guard band is required on the base-to-mobile link. It is normally not required on the mobile-to-base link because (a) the signal levels from CMRS mobile transmitters are generally significantly smaller than the signal levels from public safety mobile transmitters, and (b) the public-safety base station receivers are generally located where they cannot receive destructive interference from CMRS mobile transmitters.

may be required. The Commission should also consider whether this guard band is best treated as “dead spectrum” or whether public-safety entities should have the flexibility to operate systems in it with the understanding that they must accept any interference they receive from CMRS systems in the adjacent band.

A more spectrally-efficient approach to isolating CMRS and public safety systems may be to establish a high technology public safety spectrum set-aside adjacent to the proposed digital SMR spectrum block. Equipment in this portion of the proposed new public safety block could be required to (a) limit on-street infrastructure signal levels to prevent interference to traditional public-safety designs in the lower part of the public-safety band, and (b) be designed to withstand the relatively strong signals from digital SMR systems in the adjacent spectrum block. For example, a robustly designed, high-site digital public safety system could be a “good neighbor” to both traditional high-site public safety systems and adjacent commercial mobile radio services. Thus, the Commission could achieve the benefits of a guard band without wasting or underutilizing scarce spectrum by establishing a digital technology, high-site channel reserve that could be used by public safety operators for data services, telemetry and perhaps interoperable voice services across political jurisdictions. The Commission should also consider requiring any technology used on these channels to be open and non-proprietary and based on, or compatible with, a commercially available wireless technology. This approach would serve the public interest by spurring development of competitive advanced public safety equipment and infrastructure incorporating interference-resistant protocols.

Stronger Public Safety Signal Strength. Another alternative CMRS – public safety interference safeguard would be to require public safety systems to achieve a more robust signal in the field. As discussed in section V.A. above, typical public safety system design has

emphasized using the least infrastructure possible to control costs while providing usable coverage. This design approach assumes that public safety systems can operate effectively at lower signal levels than are used by commercial wireless networks. It is the disparity in signal strength between public safety and CMRS systems, however, that sets the stage for interference to the less robust public safety transmissions.

One approach to eliminating interference in a realigned 800 MHz band would be to require stronger public safety base-to-mobile signals, *i.e.*, a more robust signal “on the street.” By reducing the disparity between CMRS and public safety radio signals, a more robust public safety signal would be more resistant to interference from locally stronger CMRS system base station transmissions. For example, while maintaining a 40 dBu requirement for co-channel protection, the Commission could require new public safety system deployments, and expansion or upgrades of existing systems, to provide a signal strength of no less than 53 dBu in all areas requiring interference protection from nearby CMRS systems. This approach to preventing interference would generally require public safety systems to add additional infrastructure to their networks to provide more consistent and robust signals.

Selecting a Solution. The alternatives described above, individually or in combination, could provide sufficient protection against CMRS – public safety interference under the 800 MHz realigned band plan. The wideband sensitivity of public safety receivers, their resistance to intermodulation, the signal strength of public safety systems, and the types of system designs and interference resistant technologies used adjacent to the public safety block are all interrelated factors that affect how large a guard band is necessary in the public safety block to prevent interference. As part of a rulemaking proceeding to implement the proposed 800 MHz realignment plan, the Commission should consider (a) the numerical standards for the protection

that must be provided to public-safety operations, (b) how compliance is to be measured, and (c) whether to allow the public safety community, through its designated frequency coordinators or some other representative body, to determine what solutions to pursue.

Reduced CMRS Power Levels. One option the Commission should not pursue is to require CMRS operators to reduce their on-street power levels through lowering transmitter power or changing antenna characteristics. In a good-faith effort to combat interference, and as described in the Best Practices Guide, CMRS operators have voluntarily reduced on-street signal strength in some instances. While this helps to control interference in certain circumstances, it requires these CMRS systems to accept degradation of their networks and their ability to serve customers. The public interest would be disserved by requiring CMRS operators to implement this “stopgap” measure on a permanent basis throughout their networks, as to do so would inevitably create coverage “holes,” dropped calls, and disrupted service for many existing CMRS users.

In theory, CMRS operators could compensate for reduced on-street signal levels by changing or building out additional CMRS infrastructure to restore the loss in coverage and service. This would, however, impose substantial costs on carriers and their customers, thereby reducing customer access to commercial mobile radio services, particularly for less affluent citizens. It would also be very difficult to obtain the necessary local zoning and permitting approvals for installing larger CMRS antennas and towers, or for the numerous additional base station sites necessary to restore the lost service. Moreover, this approach would do nothing to correct -- and in fact would perpetuate -- the underlying spectral problem of incompatible radio system designs and uses on adjacent, interleaved and mixed 800 MHz spectrum. For these reasons, the Commission should reject any suggestion that CMRS operators employ lower power

levels as a long-term measure to prevent CMRS – public safety interference in the 800 MHz band.

C. Using Mandatory Retuning and Special Frequency Coordinators to Implement the 800 MHz Realignment

Mandatory Retuning. To achieve the public interest benefits of the 800 MHz realignment – *i.e.*, eliminating CMRS – public safety interference and making additional public safety spectrum available expeditiously – the Commission should require incumbent licensees in the targeted frequency blocks, with the exception of B/ILT and traditional SMR licensees, to retune their systems to “relocate” in the proper spectrum block. Relocation must be mandatory because any non-compliant licensee could create renewed interference potential for itself or for other affected licensees, or could block timely completion of the realignment reallocations.

Special Frequency Coordinator. To expedite and simplify retuning, the Commission should certify a special “Public Safety Realignment Frequency Coordinator” (the “Public Safety Special Coordinator”) whose responsibility would be to: (1) identify specific channel assignments for public safety licensees relocating from the NPSPAC channels to the new 800 MHz public safety channel block (806/816 – 851-861 MHz); (2) verify that the new assignments will reduce or eliminate the potential for CMRS – public safety interference while ensuring that incumbent licensees receive new licenses that are geographically and spectrally equal to or better than their original licenses; and (3) assist incumbent NPSPAC licensees with carrying out their retuning obligations.

The Public Safety Special Coordinator should be staffed by at least one representative from each of the existing FCC-certified public safety frequency coordinators,⁴⁹ as well as

⁴⁹ Nonprofit associations certified by the Commission for frequency coordination include: Association of Public Safety Communications Officials International, Inc. (“APCO”), Association of State Highway and Transportation Officials (“AASHTO”), Forestry Conservation

representation from the existing NPSPAC regional planning committees and the new 700 MHz planning organizations. Using a unified updated licensing database and computerized frequency coordination programs, the Public Safety Special Coordinator would identify and publish new channel locations for all relocating public safety licensees.⁵⁰ The Special Coordinator would carry out this process using the regional planning areas as identified for the NPSPAC channels. Individual licensees could review their new assignments and work with the Special Coordinator to undertake any refinements, changes or modifications necessary to account for local propagation anomalies and special terrain factors. The Special Coordinator would also act as a liaison and facilitator with current incumbents on the public safety block to handle the logistics of the retuning, relocations and spectrum swaps that will effectuate the relocation process.

Few if any incumbents on the lower 70 interleaved public safety channels would have to relocate because that spectrum would be within the new 20 MHz public safety block. Relocation may be desirable or necessary in some instances, however, in light of local or regional requirements or other special circumstances. The Commission should permit the Public Safety Special Coordinator to determine whether relocating lower 70-channel public safety incumbents is necessary to make efficient use of the new Public Safety block in a particular planning region and, if so, to identify new assignments within the new 20 MHz public safety spectrum block, and assist in completing such relocation.

Communications Association (“FCCA”) and International Municipal Signal Association (“IMSA”).

⁵⁰ This process may be simplified by simply transferring in its entirety the existing NPSPAC assignments in a regional planning area to a comparable spectrum sub-block in the new 20 MHz public safety channel block. This White Paper recommends that the Commission consult with the public safety community, existing frequency coordinators, and equipment manufacturers to determine the most efficacious way to identify relocation assignments for NPSPAC incumbents.

D. CMRS Licensees Should Fund the Bulk of Public Safety’s Retuning Costs

The 800 MHz realignment plan cannot be implemented unless public safety entities have sufficient funds to cover their retuning costs, including applicable engineering, equipment and site costs, base station retuning costs, handset and mobile unit retuning costs, as well as any reasonable additional costs of relocation to fully comparable facilities. In some cases, this may include the costs of new repeaters, antennae and handsets where retuning existing equipment is not practicable or replacement equipment is required to prevent interference. Because public safety communications systems are generally funded by tax revenues, government bonds or other public sources, 800 MHz relocation costs could impose an unexpected and unplanned burden on state and local governments – many of which are already struggling to meet increasing costs for roads, schools, health care and other essential public services and facilities. Thus, if public safety communications providers were required to provide funding for the entire cost of their portion of the 800 MHz realignment, it would be difficult to complete realignment in an acceptable time period. The urgent need to eliminate CMRS – public safety interference and make additional spectrum available for public safety communications systems requires that additional relocation funding resources be made available.

Therefore, the Commission should require commercial SMR providers, including Nextel and SouthernLinc®, and the 800 MHz cellular licensees to make a substantial contribution to the costs of retuning public safety communications systems. These CMRS licensees stand to benefit significantly from realigning the 800 MHz band and concomitantly adopting technical and operational requirements that ultimately will virtually eliminate CMRS – public safety interference. In particular, cellular carriers will be relieved of the burdens of detailed, ongoing coordination requirements, operational limitations and channel use restrictions necessary to

safeguard public safety communications systems from interference. Advanced SMR operators, like Nextel, will be able to consolidate spectrum holdings now mixed and interleaved with public safety and B/ILT systems into contiguous, exclusive channel blocks offering increased user capacity and freedom from the operational limits and ongoing coordination procedures otherwise necessary to mitigate and/or prevent CMRS – public safety interference.⁵¹ Cellular and advanced SMR/CMRS operators will be free to focus on competing with each other for customers, rather than diverting corporate resources to complex multi-carrier coordination efforts to prevent intermodulation products from falling on public safety channels.

Nextel will be the most substantially affected advanced CMRS licensee involved in this project. Nextel is willing to contribute up to \$500 million for relocating incumbent public safety communications systems to the new public safety channel block at 806/816 – 851/861.⁵² While this may cover a substantial portion of the public safety retuning costs, other commercial SMR providers and cellular licensees, particularly the “A” band carriers, should help fund public safety retuning costs.⁵³ As described above, cellular licensees are a primary source of CMRS –

⁵¹ Nextel has expended, on a voluntary basis, significant resources for modified antennas, special combiners, custom-made filters, modified base stations, interference drive testing, signal strength mapping, intermodulation prediction and analysis, and interference monitoring, as well as tens of thousands of man hours in carrying out these activities, to identify the source or sources of CMRS – public safety interference and to develop and implement fixes. AT&T Wireless and other cellular carriers are also incurring similar costs and overhead to mitigate interference on a case-by-case basis.

⁵² Nextel would provide this contribution contingent upon the Commission’s adoption of a Final Order: (1) creating a new digital advanced SMR channel block as described herein at 816/824 – 861/869 MHz; (2) assigning to Nextel licenses for the 6 MHz of spectrum (the current NPSPAC channels) in the new advanced SMR channel block; and (3) assigning to Nextel nationwide licenses for a contiguous 10 MHz of MSS spectrum at 2.1 MHz reallocated for terrestrial commercial mobile use.

⁵³ In addition to this contribution to public safety retuning costs, Nextel will also bear the costs of its own relocation out of channels 1– 400 to the new digital SMR spectrum block. Nextel holds many of the EA and site-by-site licenses in this spectrum. Moreover, Nextel will

public safety interference in the 800 MHz band. The realignment plan would relieve their burdens associated with responding to and mitigating the interference incidents that will become increasingly prevalent in the future.

Consequently, *all* cellular and advanced 800 MHz mobile communications providers should make a substantial contribution toward the costs of retuning public safety communications systems from the NPSPAC channels and, where necessary, interleaved lower 70 channels, to the new public safety block.⁵⁴ Public safety communications operators would contribute a lesser portion of the costs. This approach will create a public-private partnership effort to eliminate CMRS – public safety interference and make additional spectrum available for public safety communications without damaging the competitiveness of affected CMRS providers.⁵⁵

have approximately 2 MHz less spectrum at 800 MHz at the completion of retuning and will have to commence construction of a 2.1 MHz network in lieu of its planned developments at 700 MHz and 900 MHz. Accordingly, Nextel will incur more relocation costs than any other licensee under the 800 MHz realignment plan.

⁵⁴ B/ILT and traditional SMR licensees will contribute to this effort by paying their own costs of relocation. Many B/ILT users will be able to simply retune their systems to their new allocated frequencies, thus keeping their costs to a minimum. Arguably, however, B/ILT users also will benefit from access to interference-free contiguous spectrum, particularly if they choose to relocate to their new homes at 700 MHz or 900 MHz, and therefore also should contribute to the fund to relocate public safety. In addition, the Commission should support before the Congress an appropriations request to assist public safety communications entities with the costs of retuning to carry out the 800 MHz realignment plan.

⁵⁵ Such a public-private partnership would be similar to the many highly successful federal programs that offer matching funds to stimulate state or local government participation in essential programs. For example, the Interstate Highway System was originally conceived as a national defense program to speed the movement of army and other defense forces and material throughout the country; the federal government offered 70 percent funding, provided the states matched it with the remaining 30 percent. See Richard F. Weingroff, *Federal-Aid Highway Act of 1956: Creating the Interstate System*, Public Roads On-Line at 9 (1996) <<http://www.tfhr.gov/pubrds/summer96/p96su10.htm>>; Financing Federal-Aid Highways, *Appendix G: Federal Share and Availability for Significant Programs* 44 (U.S. Dept. of Transportation Federal Highway Administration, May 1992) (noting that the federal government

In identifying those costs eligible for reimbursement and establishing reimbursement procedures, the Commission should follow the approach it adopted in relocating incumbents from the upper 200 SMR channels at 800 MHz.⁵⁶ Costs incurred to retune public safety incumbents from their current channels assignments to their new assignments in the public safety channel block would be eligible for reimbursement. The costs of expanding or improving existing systems, including upgraded equipment (unless retuning the existing equipment is impractical or impossible), or correcting coverage gaps or other system shortcomings would be ineligible for reimbursement.⁵⁷

E. Using Voluntary Retuning and Special Frequency Coordinators for Realignment of B/ILT and Noise-Limited Traditional SMR Licensees

Voluntary Relocation for B/ILT Licensees. The Commission should permit incumbent B/ILT and high-site analog SMR licensees to continue operating on a secondary, non-interference basis in the 800 MHz band, while providing incentives for these licensees to relocate voluntarily to the 700 MHz band or 900 MHz band. This flexible approach would enable such

currently funds 80 percent of the interstate system). Urban mass transit, hospital construction, irrigation projects, rural electrification and many other governmental programs use this type of shared funding approach. *See, e.g., id.* (mass transit); Center for Public Service, *Government's 50 Greatest Endeavors: Enhancing the Nation's Health Care Infrastructure*, p. 1-2, Nov. 12, 2001 <www.brook.edu/gs/cps/50ge/endeavors/healthcare.htm> (hospital construction); Larry Todd, Bureau of Reclamation, *Statement on S. 2881: Small Reclamation Water Resources Act of 2000*, July 25, 2000 <www.doi.gov/ocl/2000/s2881.htm> (irrigation projects); Office of Industrial Technologies, *NICE*³, Nov. 12, 2001 <www.oit.doe.gov/nice3> (describing the cost-sharing program created by the Department of Energy to promote energy efficiency and stating that non-federal funds must account for at least 50 percent of the total cost of the project).

⁵⁶ See Amendment of Part 90 of the Commission's Rules to Facilitate Future Development of SMR Systems in the 800 MHz Frequency Band, *First Report and Order, Eighth Report and Order, and Second Further Notice of Proposed Rule Making*, 11 FCC Rcd. 1463, 1510, ¶ 79 (1995), *aff'd by Memorandum Opinion and Order on Reconsideration*, 14 FCC Rcd. 17556, 17577, ¶ 38 (1999).

⁵⁷ In most cases replacement equipment will not be necessary because existing public safety system hardware can be returned to the new public safety channel block.

licensees and public safety planners to take into account variances in public safety spectrum needs on a local and/or regional basis. Public safety users may not need to inhabit this spectrum immediately throughout the nation; incumbents could remain in those locations (*e.g.*, rural or less populated areas) until public safety users need the spectrum. In addition, some B/ILT and high-site SMRs may use system designs or technologies that can co-exist with primary public safety use on a secondary, non-interference basis. Thus, the approach recommended herein would allow B/ILT and high-site SMR incumbents in the 806/816 – 851/861 block to evaluate local spectrum demand requirements and the realities of secondary status in that venue versus moving to new assignments at 700 MHz or 900 MHz. Incumbents could choose to take advantage of guaranteed replacement assignments on a first-come, first-served basis, or “take their chances” on future relocation spectrum availability.⁵⁸

B/ILT Special Frequency Coordinator. The FCC should also create a separate B/ILT Realignment Frequency Coordinator (the “B/ILT Special Coordinator”) to identify specific channel assignments for voluntary relocations by B/ILT licensees and high-site traditional SMR systems in the reallocated 4 MHz of former SMR channels at 900 MHz and the 700 MHz former guard band. Specifically, the B/ILT Special Coordinator would be responsible for: (1) identifying specific channel assignments for traditional “noise-limited” SMR and B/ILT licenses voluntarily relocating from the lower 800 MHz channels to the new 700 MHz or 900 MHz co-primary B/ILT and high-site SMR channel block; (2) verifying that the new assignments will reduce or eliminate the potential for CMRS – public safety interference while ensuring that relocated licensees receive new licenses that are geographically and spectrally equal to or better than their original licenses; and (3) assisting incumbents that must be relocated with carrying out

⁵⁸ Some of these incumbents may choose over time to take service from commercial

their retuning obligations. Using a first-come, first-served licensing approach will encourage incumbent licensees to take advantage of this newly available spectrum and thereby facilitate voluntary relocation from the new public safety block, particularly in metropolitan areas where public safety licensees will have the most urgent need for this additional spectrum.

The B/ILT Special Coordinator should include representation from the B/ILT and SMR certified Frequency Coordinators: AMTA, the Industrial Telecommunications Association (“ITA”), the Personal Communications Industry Association (“PCIA”) and the Utilities Telecommunications Council (“UTC”). The B/ILT Special Coordinator would perform essentially the same functions for its constituency as the Public Safety Special Coordinator performs for public safety: identifying new channel locations for the incumbents being relocated, working with those individual incumbents to account for local propagation anomalies and special terrain factors, or facilitating other refinements or modifications required to complete the relocations.

Advanced Technology B/ILT Systems. The Commission should consider requiring the B/ILT Special Coordinator to designate a portion of the new 900 MHz traditional SMR/B/ILT channel block for advanced technology B/ILT private systems. Some B/ILT licensees have acquired and operate advanced, multiple-site, frequency reuse communications systems using the same network architecture as CMRS systems.⁵⁹ The FCC should examine whether the Special Coordinator should designate certain frequencies at 900 MHz for the development of such

providers and “surrender” their secondary channel assignments.

⁵⁹ For example, some utility companies are implementing high power, high site iDEN systems, to obtain more capacity and robust in-building coverage. These systems and high-site, high power traditional analog SMR and B/ILT system designs should be able to coexist with little or no special planning or frequency coordination. Alternatively, the Special Coordinator should create set-aside spectrum for these types of systems, or the FCC should impose operating requirements or other limiting parameters to ensure compatibility.

systems to prevent creating at 900 MHz the type of mixed and interleaved spectrum licensing that has created interference problems in the 800 MHz band.

Channel Bandwidth at 900 MHz. The Commission should examine whether to retain the current 12.5 kHz channel bandwidth at 900 MHz. It could require all migrating B/ILT and analog SMRs to use 12.5 kHz equipment in the 900 MHz band, or it could permit the Special Coordinators to assign two adjacent channels to a licensee for every one 800 MHz channel to permit the licensee to continue to use 25 kHz equipment. The Commission would need to address whether it should take a different approach in relocating analog SMR systems, analog noise-limited B/ILT systems, or digital, frequency-reuse B/ILT relocatees. Incumbents being relocated should be encouraged to make the most efficient use of this spectrum, either by FCC requirements or by steps taken by the Special Coordinator.

Utility Company Licensees. Utility companies licensed on the 800 MHz B/ILT channels would be accommodated by relocation to the former 900 MHz SMR channels or former 700 MHz Guard band channels. The 900 MHz channels are already interleaved with 5 MHz of 900 MHz spectrum allocated for private, internal use B/ILT systems; accordingly, this reallocation would create a 10 MHz block for B/ILT licensees, including utilities, as well as the remaining analog, traditional SMR systems. This reallocation of 900 MHz channels for co-primary B/ILT and traditional SMR services, coupled with the 4 MHz of 700 MHz guard band spectrum Nextel is making available, offers more spectrum than these licensees have available today at 800 MHz. This relocation would permit utility company licensees to expand their systems in the future, particularly those that provide communications for critical utility services. Comments recently filed in response to a request by the National Telecommunications and Information Administration (“NTIA”) point out that energy and water companies, in particular, have special

spectrum needs that closely parallel those of public safety entities.⁶⁰ In light of this, the Commission should consider whether to reserve certain channels in the new 900 MHz B/ILT and high-site SMR spectrum block for the internal communications needs of critical infrastructure utility companies, such as water, gas, or electric utilities.⁶¹

F. Implementation Timetable

Given the risk that disruption of life safety communications creates for the well being of public safety personnel and the citizens they serve, the public interest requires that the 800 MHz realignment be completed as rapidly as practicable.⁶² It will not be possible, however, to retune all of the land mobile community at once. The following reallocation/retuning implementation plan balances these two considerations:

- The following rule changes should be effective upon Commission adoption of a Report and Order implementing the 800 MHz realignment plan: (1) reallocation of the 2020/2025 – 2170/2175 MHz MSS spectrum to terrestrial mobile communications, and, as part of the spectrum swap, assignment (licensing) of this spectrum to Nextel through a nationwide license; (2) redesignation of the 762/764 – 792/794 MHz Guard band channels, and the 896/901 – 935/940 MHz SMR channels, to co-primary B/ILT and high-site SMR use; (3) establishment of the new 20 MHz Public Safety block at 806/816 – 851/861 MHz with a transition period to relocate all affected CMRS and public safety licensees, and with all incumbent B/ILT and high-

⁶⁰ See Department of Commerce, National Telecommunications and Information Administration, *Request for Comment on Energy, Water and Railroad Service Providers' Spectrum Use Study*, 66 FR 18447 (2001). NTIA has been directed by Congress to prepare a report by December 21, 2001 on the spectrum needs of these entities, and, six months after NTIA's report has been released the Commission similarly has been directed by Congress to submit and report on the actions that could be taken by the Commission to address the needs identified by NTIA.

⁶¹ The B/ILT Special Coordinator could set-aside part of the 900 MHz channel block for critical infrastructure radio communications systems used by public utility operators. Such systems could include wireless communications to dispatch service and maintenance personnel and help control, monitor and maintain generating systems, electric grids, gas pipelines, water distribution systems and similar critical utility operations.

⁶² Under these circumstances, a voluntary negotiating period in which to reach agreement on a retuning proposal could delay substantially the solution and thus would not be in the public interest.

site SMR licensees in this spectrum converted to secondary status; and (4) establishment of the new advanced technology SMR block at 816/824 – 861/869 MHz and assignment (licensing) of the 821/824 – 866/869 portion of it to Nextel.⁶³

- With the assistance of the Public Safety Special Coordinator, incumbent public safety NPSPAC licensees (821/824 – 866/869 MHz) would begin moving to the new 806/816 – 851/861 MHz public safety channel block as incumbents relocate in the priority order discussed below. At the same time, analog SMRs and B/ILT licensees in channels 1- 400 would commence voluntary relocation to the 900 MHz or 700 MHz bands, with the assistance of the B/ILT Special Coordinator, to clear channels 1 - 400 for ongoing public safety relocations.
- Once the NPSPAC channels are cleared, Nextel would complete relocating its remaining operations on channels 1 – 400 to the former NPSPAC channels or the upper 200 channels.

The 800 MHz realignment and associated licensee relocations should be completed within 36 months of the effective date of a Report and Order adopting the realignment plan. The following relocation schedule gives priority first to relocations necessary to mitigate acute unresolved interference, and second to retuning licensees in areas most likely to experience CMRS – public safety interference:

- For markets with acute, unresolved CMRS – public safety interference, channel swaps and retuning should be completed within 12 months of the effective date of the Report and Order;
- Channel swaps and retuning would be completed in all remaining top 30 Economic Areas (“EAs”) within 24 months;
- Channel swaps and retuning should be completed in the top 80 EAs within 30 months;
- All remaining relocations and swaps completed within 36 months of Commission adoption of a Report and Order regarding the 800 MHz realignment plan.

If at any time CMRS – public safety interference in any market cannot be satisfactorily controlled using short-term corrective measures (*e.g.*, lower power, higher antenna height,

⁶³ As discussed previously, Nextel already holds nearly all of the incumbent EA and site-by-site licenses in the current 816/821 – 861/866 MHz portion of the new advanced SMR block

modified frequency use at the problem site), the public safety licensee should have the right to request that the Public Safety Special Coordinator advance the retuning of that entity and/or market. The Commission should empower the Public Safety Special Coordinator to require that any such retuning project be completed within nine months or sooner, if practicable.⁶⁴

VII. LEGAL AUTHORITY

The Commission's authority to assign and reallocate spectrum and to relocate incumbent licensees derives from several provisions of the Act, including sections 4(i), 303(c), 303(f), 303(r), and 316.⁶⁵ These same provisions also authorize the Commission to convert non-relocating incumbents from primary to secondary status when necessary to advance the public interest. As discussed below, the Commission has exercised both types of authority in the past, and would face no legal obstacles to exercising such authority under the proposed 800 MHz realignment plan.

A. Authority to Mandate Incumbent Relocation

On numerous occasions, the Commission has exercised its authority to require incumbent licensees to relocate to different parts of the spectrum when necessary to advance the public interest. For example, in 1965, the Commission reallocated Business Radio Service spectrum "as a matter of sound spectrum planning."⁶⁶ In that case, the Commission required that private community antenna television systems ("CATV") relocate, at their own expense, from the

and would retain these licenses.

⁶⁴ The Public Safety Special Coordinator would notify the B/ILT Special Coordinator so that any necessary moves of B/ILT and analog SMR stations could be completed to permit the relocations necessary to eliminate the interference.

⁶⁵ 47 U.S.C. §§ 4(i), 303(c), 303(f), 303(r), and 316.

⁶⁶ Amendment of the Commission's Rules Relative to the Licensing of Microwave Radio Stations Used to Relay Television Signals to Community Antenna Television Systems, *First*

spectrum allocated for Business Radio users to an adjacent band. Finding that CATV spectrum needs were growing,⁶⁷ the Commission sought to accommodate future CATV needs by reallocating spectrum and dedicating it to CATV use, with the *quid pro quo* that existing licensees relocate themselves to the newly-allocated part of the band.

More recently, in the Emerging Technologies proceeding, the Commission reallocated 220 MHz of spectrum in the 1.85 to 2.20 GHz band from private and common carrier fixed microwave use to use by “emerging technologies.”⁶⁸ While existing public safety fixed microwave licensees were initially allowed to remain in the band on a co-primary basis,⁶⁹ the Commission reconsidered that decision and, on its own motion, determined that all microwave incumbents, including public safety users, would be required to relocate.⁷⁰ This decision was upheld by the United States Court of Appeals for the D.C. Circuit. The court stated that the Commission’s finding that “it is in the public interest to subject all incumbent . . . fixed microwave facilities, including public safety licensees, to mandatory relocation” adequately articulated a reasoned analysis, based on the record, to require the relocation.⁷¹

Report and Order and Further Notice of Proposed Rulemaking, 1 FCC 2d 897, ¶ 32 (“1965 Reallocation Order”).

⁶⁷ *1965 Reallocation Order* ¶ 35.

⁶⁸ Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies, *First Report and Order and Third Notice of Proposed Rule Making*, 7 FCC Rcd 6886, ¶ 1 (1992) (“*Emerging Technologies Order*”). Ultimately the Commission allocated this spectrum for PCS.

⁶⁹ *Id.* ¶ 26.

⁷⁰ Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies, *Memorandum Opinion and Order*, 9 FCC Rcd. 1943, ¶ 34 (1994).

⁷¹ *Association of Public Safety Communications Officials-International, Inc. v. FCC*, 76 F.3d 395, 400 (D.C. Cir. 1996).

The Commission’s authority to relocate public safety and digital SMR incumbents in the 800 MHz band is not diminished by the fact that portions of this spectrum were licensed through competitive bidding under Section 309(j) of the Act.⁷² Indeed, as section 309(j) itself makes clear, Congress intended licenses assigned by auction to be regulated no differently from licenses assigned by other means:

Nothing in this subsection, or in the use of competitive bidding, shall—

(A) alter spectrum allocation criteria and procedures established by the other provisions of this Act; [or]

...

(C) diminish the authority of the Commission under the other provisions of this Act to regulate or reclaim spectrum licenses; [or]

(D) be construed to convey any rights, including any expectation of renewal of a license, that differ from the rights that apply to other licenses within the same service that were not issued pursuant to this subsection[.]⁷³

Because the Commission’s authority to regulate and reclaim spectrum extends to all licensees, including those that acquired licenses through competitive bidding, the Commission is fully empowered to require incumbents in the 800 MHz band to relocate as needed to further the public interest.

The Commission also has authority to convert hold-over incumbent licensees to secondary status. Specifically, the Commission has previously granted incumbent licensees the option of either retaining their existing licensed channels on a secondary, non-interference basis

⁷² 47 U.S.C. § 309(j).

⁷³ 47 U.S.C. § 309(j)(6). *See also* Applications of TV Active, LLC et al. for Consent to the Assignment of Licenses in the 218-219 MHz Service, *Order on Reconsideration*, DA 01-2503, FCC File No. 0000334630, 2001 WL 1312891, ¶ 21, n.70 (Oct. 26, 2001) (“Section 309(j)(6)(C) and (D) of the Communications Act, 47 U.S.C. §§ 309(j)(6)(C)-(D), makes clear that the use of competitive bidding in spectrum allocation does not diminish the Commission’s authority to regulate spectrum licenses.”).

or voluntarily relocating their operations on a preferential basis during an accommodation period.⁷⁴ The Commission thus possesses the legal authority to grant this same option to incumbent B/ILT and traditional high-site SMR licensees currently operating in the 800 MHz band.

B. The Ashbacker Doctrine and Section 309(j) Are Not Implicated by the 800 MHz Realignment Plan

The proposed 800 MHz realignment plan is fully consistent with administrative law due process requirements, including the *Ashbacker* doctrine,⁷⁵ as well as the competitive bidding provisions set forth in section 309(j) of the Act.⁷⁶ The plan would entail the reallocation of certain spectrum bands and modifications of existing licenses pursuant to section 316 of the Act.⁷⁷ Pursuant to the plan, incumbent licensees would effectively “swap” spectrum, trading their current channel assignments for alternative assignments to eliminate the underlying causes of CMRS - public safety interference and allocate additional spectrum to public safety communications.⁷⁸ Because these swaps of *already-occupied* frequencies would not require the

⁷⁴ See, e.g., Establishment of a Spectrum Utilization Policy for the Fixed and Mobile Services’ Use of Certain Bands between 947 MHz and 40 GHz, *First Report and Order*, Gen. Docket No. 82-334, 54 Rad. Reg. 2d (P & F) 1001 (1983) (12 GHz incumbent Operational Fixed Service licensees given option of retaining their existing licensed facilities on a secondary basis to Direct Broadcast Satellite Service, or relocating their operations on a preferential basis during a five-year accommodation period) (citing, *inter alia*, sections 4(i), 303(c), and 303(r) of the Act).

⁷⁵ *Ashbacker Radio Corp. v. FCC*, 326 U.S. 327 (1945) (“*Ashbacker*”).

⁷⁶ 47 U.S.C. § 309(j).

⁷⁷ 47 U.S.C. § 316(a)(1) (“Any station license or construction permit may be modified by the Commission either for a limited time or for the duration of the term thereof, if, in the judgment of the Commission such action will promote the public interest”).

⁷⁸ Commercial users would swap their current licenses in return for alternative spectrum licenses providing comparable replacement spectrum in order to help eliminate interference to 800 MHz public safety communications systems. For example, Nextel would swap a total of 16 MHz on which it holds licenses today – 8 MHz from 800 MHz and 4 MHz each from 700 MHz

Commission to issue any licenses to new licensees or for new services, and because the Commission may permissibly limit eligibility for spectrum licenses when doing so serves the public interest, the proposed plan would not trigger either the *Ashbacker* doctrine or section 309(j).

Ashbacker Doctrine. In *Ashbacker*, the Supreme Court held that, if two bona fide applications for an open frequency are mutually exclusive, they are entitled to a comparative hearing.⁷⁹ *Ashbacker* is only triggered when an “open” frequency is being assigned, and the U.S. Court of Appeals for the D.C. Circuit has held that “*Ashbacker* does not compel the Commission to hold comparative hearings in order to approve channel exchanges[.]”⁸⁰

In light of this holding, in previous situations where licensees have exchanged their current licenses for equivalent licenses using a different frequency, the Commission has concluded that section 316 of the Act authorizes such modifications.⁸¹ The proposed 800 MHz realignment plan contemplates precisely this kind of license exchange. Accordingly, with respect to all the spectrum that would be effectively “swapped” under the proposed plan, the *Ashbacker* doctrine would not impair the Commission’s authority, pursuant to section 316 of the

and 900 MHz – and will receive 16 MHz in return – 10 MHz from 2.1 GHz MSS and 6 MHz from the 821/824 – 866/869 NPSPAC channels. B/ILT licensees would likewise swap their 800 MHz licenses for comparable 700 MHz or 900 MHz licenses to facilitate the interference-resolving 800 MHz spectrum realignment, while public safety licensees in the NPSPAC channels are simply exchanging those licenses for comparable spectrum rights in the new consolidated 806/816 – 851/861 MHz public safety channel block.

⁷⁹ *Ashbacker*, 326 U.S. at 332.

⁸⁰ *Rainbow Broadcasting Co. v. FCC*, 949 F.2d 405, 410 (D.C. Cir. 1991). *See also* Amendment of Section 73.606(b), Table of Allotments, Television Broadcast Stations and Section 73.622(b), Table of Allotments, Digital Television Broadcast Stations (Buffalo, New York), *Report and Order*, 14 FCC Rcd. 11856, ¶ 12 (1999) (“*Channel Swap Order*”) (“in the case of channel exchanges, the rule of *Ashbacker* does not apply because the channels are occupied”).

⁸¹ *See, e.g. Channel Swap Order*.

Act, to relocate incumbent licensees to different spectrum assignments to resolve the CMRS – public safety interference issues described above.

The *Ashbacker* doctrine likewise does not preclude the Commission from allocating additional spectrum to public safety services and, to make this possible, assigning 10 MHz of reallocated MSS spectrum to Nextel in exchange for spectrum Nextel would surrender as part of the realignment plan. As a long line of precedents demonstrates, *Ashbacker* does not prevent the FCC from “promulgat[ing] rules limiting eligibility to apply for a channel when such action promotes the public interest, convenience and necessity.”⁸² Thus, because of the important public interest goals it would advance, the Commission would be free to promulgate rules that would effectively make Nextel the only eligible licensee of the 2020/2025 and 2170/2175 MHz portion of the MSS band.

As the commercial licensee most interleaved with and adjacent to public safety licensees, Nextel is directly affected by any realignment plan that creates the separate public safety and commercial spectrum blocks necessary to mitigate 800 MHz CMRS – public safety interference. Nextel’s cooperation in voluntarily relocating from the new public safety block, and voluntarily making spectrum available to relocate B/ILT and high-site SMR licensees from the public safety block, is an essential element of the realignment plan. The Commission has full authority to earmark and assign to Nextel the replacement channels necessary to make Nextel whole in this

⁸² Amendment of the Commission’s Rules to Permit FM Channel and Class Modifications by Application, *Report and Order*, 8 FCC Rcd. 4735, ¶ 16 (1993) (citing *U.S. v. Storer Broadcasting Co.*, 351 U.S. 192 (1956)). See also *Aeronautical Radio, Inc. v. FCC*, 928 F.2d 428, 439 (D.C. Cir. 1991) (the FCC may reject, without a hearing, applications that do not meet valid eligibility requirements); Amendment of the Commission’s Rules Regarding Modification of FM Broadcast Licenses to Higher Class Co-channel or Adjacent Channels, *Report and Order*, 60 Rad. Reg. 2d (P & F) 114, ¶ 17 (1986) (“The Commission can promulgate rules limiting eligibility to apply for a newly allotted channel in circumstances where, in its determination, such action promotes the public interest, convenience and necessity.”).

spectrum swap and make implementing the 800 MHz realignment plan possible. The realignment plan, in turn, will mitigate the problem of CMRS-Public Safety interference while making additional spectrum available for public safety communications.

Section 309(j). Section 309(j) of the Act authorizes the Commission to award “initial” spectrum licenses through the use of a competitive bidding system.⁸³ Section 309(j) exempts from competitive bidding applications for public safety spectrum.⁸⁴ The assignment of spectrum licenses to public safety services under an 800 MHz band realignment plan and the allocation of additional spectrum to public safety consequently would thus not trigger the section 309(j) competitive bidding procedures.

Section 309(j) would likewise not be implicated by the proposed reallocation and redesignation of the 800 MHz spectrum used by private radio and SMR licensees. Instead of applying for “initial license[s]” under section 309(j)(1), these licensees would merely receive licenses for replacement spectrum in exchange for the spectrum licenses they will surrender as part of the realignment plan. Accordingly, the reallocation proposal would not trigger the competitive bidding requirements of section 309(j).

This analysis is consistent with other cases in which the Commission has relocated wireless licensees from one frequency block to another comparable block without triggering section 309(j)’s competitive bidding requirements for initial licenses. The Commission recently held, for instance, that section 309(j) was not a valid basis for granting a Petition for

⁸³ See 47 U.S.C. § 309(j)(1) (“If, consistent with the obligations described in paragraph (6)(E), mutually exclusive applications are accepted for any initial license or construction permit, then, except as provided in paragraph (2), the Commission shall grant the license or permit to a qualified applicant through a system of competitive bidding that meets the requirements of this subsection.”).

⁸⁴ 47 U.S.C. § 309(j)(2)(A).

Reconsideration of an earlier order mandating the relocation of Digital Electronic Message Service (“DEMS”) licensees:

Because its actions [to relocate DEMS licensees to new spectrum] were license modifications under authority of Section 316, and did not involve the grant of initial licenses, the Commission was not authorized under Section 309(j) of the Act to use auction procedures. Those auction procedures may only be used to select from among mutually exclusive applications for initial licenses. Accordingly, petitioners’ reliance on Section 309(j) of the Act is misplaced.⁸⁵

Like the relocated DEMS licensees, the incumbents affected by the proposed plan would be relocated under authority of section 316 of the Act, and not section 309(j).

VIII. MOBILE SATELLITE SERVICE CONSIDERATIONS

A. Effect on Pending MSS Rulemakings

To implement effectively the realignment of the 800 MHz Land Mobile Radio band and allocate additional spectrum to public safety, it will be necessary to reallocate the 2020/2025 and 2170/2175 MHz bands to terrestrial mobile services, and to assign that spectrum to Nextel in exchange for spectrum relinquished by Nextel for reassignment to public safety communications services, B/ILT licensees and high-site SMR licensees. The Commission has already proposed, in a separate pending rulemaking (“*Advanced Wireless Services Proceeding*”), to reallocate a portion of the MSS spectrum in the 1990-2025 MHz and 2165-2200 MHz bands to support the introduction of new advanced mobile and fixed terrestrial wireless services (advanced wireless services), including third generation (3G) and future generations of wireless systems.⁸⁶ In that

⁸⁵ Amendment of the Commission’s Rules to Relocate the Digital Electronic Message Service from the 18 GHz Band to the 24 GHz Band and to Allocate the 24 GHz Band for Fixed Service, *Memorandum Opinion and Order*, 13 FCC Rcd. 15147, ¶ 59 (1998) (citations omitted).

⁸⁶ See Amendment of Part 2 of the Commissions Rules to Allocate Spectrum Below 3 GHz for Mobile-and Fixed Services to Support the Introduction of New Advanced Wireless Services,

proceeding, the Commission requested comments on various spectrum reallocation options that were intended to preserve sufficient spectrum for 2 GHz MSS operations and, at the same time, make available some of the 2 GHz MSS spectrum for advanced wireless services.

For the reasons discussed herein, the Commission should reallocate the 2020/2025 and 2170-2175 MHz MSS frequency bands on a primary basis to terrestrial advanced mobile services. It should assign these frequency bands to Nextel in return for Nextel's swapping certain 700, 800 and 900 MHz spectrum for public safety purposes. These actions will serve the public interest by resolving CMRS – public safety interference in the 800 MHz band, addressing critical spectrum needs of the public safety services, and affording Nextel replacement spectrum for its use in providing terrestrial mobile services.

B. Relocation of Incumbent Broadcast Auxiliary Service and Fixed Service Licensees in the 2020/2025 and 2170/2175 MHz Bands

The MSS spectrum in the 2020/2025 MHz and 2170/2175 MHz bands that would be reallocated to terrestrial mobile services and assigned to Nextel as part of the 800 MHz realignment plan is currently used by Broadcast Auxiliary (“BAS”) and Fixed Service (“FS”) licensees, who also operate in other parts of the MSS band. In the Commission's proceeding to allocate 2 GHz spectrum to MSS, it adopted a plan to relocate BAS and FS licensees operating on this spectrum to other spectrum bands.⁸⁷ The current BAS relocation plan consists of a complex, two-phase, market-staggered approach that would relocate gradually incumbent BAS licensees over many years as MSS systems became operational. Incumbent FS licensees would

Including Third Generation Wireless Systems, *Memorandum Opinion and Order and Further Notice of Proposed Rulemaking*, ET Docket No. 00-258 (Aug. 20, 2001) (“2 GHz MO&O and FNPRM”).

⁸⁷ See *Amendment of Section 2.106 of the Commission's Rules to Allocate Spectrum at 2 GHz for Use by the Mobile Satellite Service*, Second Report and Order and Second Memorandum Opinion and Order, ET Docket No. 95018, 15 FCC Rcd. 12315, 12326-27 (2000).

be relocated to the extent they received harmful interference from MSS, but would not be required to relocate if they could successfully share spectrum with MSS. Under the plan the Commission adopted, MSS licensees would compensate incumbent BAS and FS licensees for the costs incurred in relocating.

As described above, the Commission has recently sought comment in its *Advanced Wireless Services Proceeding* on whether to reallocate some portions of the MSS band to advanced terrestrial wireless services. In doing so, it recognized that the current phased relocation of BAS might not be practical if such a reallocation plan were adopted because advanced wireless services would be deployed faster than MSS operations. It consequently sought comment on (1) how the current BAS and FS relocation plan would have to be modified to accommodate a reallocation of spectrum for terrestrial wireless use; (2) what the relocation responsibilities of new MSS and terrestrial wireless entrants would be; and (3) whether new MSS and terrestrial wireless entrants would share the relocation costs on a pro rata basis.⁸⁸

The Commission will need to address the same issues with respect to the 2020/2025 MHz and 2170/2175 MHz bands that would be reallocated and assigned to Nextel under an 800 MHz realignment plan. In doing so, the Commission should ensure that the different users of the MSS band share BAS and FS relocation costs on an equitable basis. It should also seek to expedite the current BAS and FS relocation process, at least with respect to the 2020/2025 MHz and 2170/2175 MHz bands, in order to implement the 800 MHz realignment plan under the timetable described above. Because of the urgent need to resolve CMRS – public safety interference in the 800 MHz band and to allocate additional spectrum to public safety, the Commission should give priority to adopting a modified BAS and FS relocation plan for the 2020/2025 MHz and

⁸⁸ 2 GHz MO&O and FNPRM at ¶¶ 32-34.

2170/2175 MHz bands so that these bands can be cleared in an expeditious manner. Relocation issues involving other portions of the MSS band should be deferred to the extent practicable for consideration in the Commission's pending *Advanced Wireless Services Proceeding*.

IX. CONCLUSION

Given the critically important life-safety services supported by public safety communications systems, the Commission should implement remedial actions promptly. Commercial-public safety radio interference will increase unless the shared, mixed and interleaved licensing of the 800 MHz land mobile radio band is realigned and commercial licensees and public safety communications licensees are relocated to different, separate channel blocks.

Public safety communicators also urgently need additional spectrum. This White Paper sets forth a comprehensive plan to address these critical matters in an expeditious, effective manner. The Commission should move rapidly to adopt a Notice of Proposed Rulemaking in substantial accord with the 800 MHz realignment plan discussed herein, so that it can receive the comments, suggestions and ideas of all interested parties and, so informed, enact the rule changes needed to mitigate CMRS – public safety interference at 800 MHz while protecting the fundamental interests of all affected licensees, and at the same time double the near-term spectrum available at 800 MHz for public safety communications systems.

Respectfully submitted,

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