Before the

FEDERAL COMMUNICATIONS COMMISSION

Washington, D.C. 20554

In the Matter of	**)**	
	)	
An Allocation of Spectrum for the	**)**	**RM-____**
Private Mobile Radio Services	**)**	

TO: The Commission

PETITION FOR RULE MAKING
SUBMITTED BY THE
LAND MOBILE COMMUNICATIONS COUNCIL

April 22, 1998

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Executive Summary

On August 5, 1997, the Balanced Budget Act of 1997 ("Budget Act") was signed into law.[1] Accompanying the Budget Act was the Report of the House and Senate Conferees which included the following directive:

> [T]he conferees expect the Commission and the NTIA to consider the need to allocate additional spectrum for shared or exclusive use by private wireless services in a timely manner.[2]

Also in August of 1997, the Spectrum Planning and Policy Advisory Committee ("SPAC") released its report to the National Telecommunications and Information Administration ("NTIA") on the implementation of Federal Government spectrum relocation.[3] This report recommends that the NTIA consider a transfer of Federal Government spectrum on a shared basis and states that there is an "ingrained symmetry" between Federal Government and Industrial and Business radio systems.

Accordingly, in order to expedite the consideration of the needs of the private wireless services community, and to promote the sharing of Federal Government spectrum with the private mobile radio services, the LMCC is submitting this petition.

The LMCC also takes this opportunity to detail its views on responsible spectrum management and effective methods for the allocation and assignment of spectrum for the Private Mobile Radio Services ("PMRS"). To that end, included in this petition is the following:

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[1] *See* Balanced Act of 1997, Pub. L. No. 105-33, 111 Stat. 251 (1997).

[2] 143 Congressional Record H6172 (July 29, 1997).

[3] *Report of the Spectrum Planning and Policy Advisory Committee Task Force on Federal Government Spectrum Relocation Implementation* (released August 7, 1997).

- A review of the development of the Commission's Commercial Mobile Radio Services licensing processes, and the impact this development has had on the PMRS community.

- A demonstration of the pressing need for additional spectrum allocations for PMRS systems, including; current congestion on existing bands, increasing spectrum scarcity resulting from simple growth and demographic changes; the need to implement new broader band technologies, including voice-data capabilities and system integrations.

- An examination of the unique characteristics and service requirements of PMRS systems, and the inability of commercial service providers to meet these unique needs.

- An identification of specific bands of spectrum available for allocation to PMRS systems.

- An analysis of the most efficient means for the management of a shared allocation of spectrum, including: engineering criteria; administrative processes; and Commission-certified frequency advisory committee management that minimizes the need for the expenditure of scarce Commission resources.

In addition to the issuance of the Balanced Budget Act Conference Report, and the release of the SPAC Report, this petition is in response to the sense within the PMRS community that the needs of this vital industry are not being adequately addressed by the Commission. The LMCC believes that there is a pressing need for the Commission to engage in a public dialogue on the character and needs of the PMRS industry. Accordingly, the LMCC urges the Commission to place this petition on *Public Notice* as quickly as possible. If nothing else, the ensuing comments and public debate will surely provide the Commission with a greater insight into the current environment and future development of one of its oldest and largest constituencies.

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Petition for Rule Making
Submitted by the
Land Mobile Communications Council

1. The Land Mobile Communications Council ("LMCC"), pursuant to Section 1.401 of the Rules and Regulations of the Federal Communications Commission ("Commission"), respectfully submits this Petition for Rule Making seeking an allocation of spectrum for the Private Mobile Radio Services ("PMRS"). This petition is in response to the report of the House and Senate Budget Act conferees which directed the Commission to consider the need to allocate spectrum for the private wireless services,[1] and the report of the Spectrum Planning and Policy Advisory Committee on Federal Government Spectrum Relocation Implementation, which supported the shared use of government spectrum with non-government entities.[2]

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[1] 143 Congressional Record H6172 (July 29, 1997).

[2] *See Report of the Spectrum Planning and Policy Advisory Committee Task Force on Federal Government Spectrum Relocation Implementation* (released August 7, 1997).

I. Statement of Interest

2. The LMCC is a non-profit association of organizations representing virtually all users of land mobile radio systems, providers of land mobile services, and manufacturers of land mobile radio equipment. The LMCC acts with the consensus and on the behalf of the vast majority of public safety, business, industrial, private, common carrier, and land transportation radio users, as well as a diversity of land mobile service providers and equipment manufacturers. The membership of the LMCC includes the following organizations:

- Association of American Railroads (AAR)
- American Association of State Highway and Transportation Officials (AASHTO)
- American Automobile Association (AAA)
- American Mobile Telecommunications Association (AMTA)
- American Petroleum Institute (API)
- American Trucking Associations, Inc. (ATA)
- Association of Public Safety Communications Officials-International, Inc. (APCO)
- Cellular Telecommunications Industry Association (CTJA)
- Central Station Alarm Association (CSAA)
- Forest Industries Telecommunications (FIT)
- Forestry-Conservation Communications Association (FCCA)
- Industrial Telecommunications Association, Inc. (ITA)
- Intelligent Transportation Society of America (ITSA)
- International Association of Fire Chiefs (IAFC)
- International Association of Fish and Wildlife Agencies (IAFWA)
- International Municipal Signal Association (IMSA)
- International Taxicab and Livery Association (ITLA)
- Manufacturers Radio Frequency Advisory Committee (MRFAC)
- National Association of State Foresters (NASF)
- Personal Communications Industry Association (PCIA)
- Telecommunications Industry Association (TIA)
- UTC, The Telecommunications Association (UTC)

II. Background

3. Private radio was born out of the special needs of industry for communications -- needs that the common carrier companies could not fulfill. Companies choose to be private radio

licensees because their communications needs are too specialized; their coverage areas too unique; and their system reliability needs too critical to rely on a third-party provider of communications. These wireless communications systems allow industry to be more productive and competitive world-wide, hut the ability to communicate in times of crisis can save lives within the company and the community as well.

4. Nearly all of the FORTUNE 500 companies have at least one radio system licensed in the private radio services. The top 10 industrial companies have more than 6,000 private land mobile licenses. Today, more than 275,000 American companies, both large and small, use more than 10 million Private radios to keep their operations running smoothly.

5. The history of Private radio is the history of the regulation of the radio spectrum itself. When initially allocating spectrum under the Communication Act of 1934, the Commission included an allocation for Private users, such as public safety, aviation and agriculture. In the late 1930's and 1940's, spectrum allocations expanded to include other Private users, such as industrial companies; railroads; urban transit; electrical, water and gas utilities; forestry; and taxicab and livery companies.

6. Spurred on by technological advances during World War II, individual companies and industries increasingly used Private radio to meet their unique needs. These communications systems helped increase employee safety for companies, as well as making them more competitive. For example, crews aboard rolling trains used radio to advise personnel at switching points of the train's movement, while newspapers used radios to communicate breaking stories.

7. Private internal radio systems have become the predominant method by which taxicab companies dispatch their fleets; service organizations coordinate maintenance runs; and companies

in all industries schedule distribution of their products. It is a vital tool used by petroleum companies such as Amoco Corporation, in oil production, monitoring, and exploration. Dispatch radios help increase productivity in retail operations, both with in-store use and in delivering products. Factories and factory campuses such as Boeing's Seattle facility -- one of the world's largest -- depend on Private radio for their production-line and logistical communications.

8. Today, private radio systems are also used by companies in almost every industry: agriculture, construction, health care, hospitality, film and video production, highway maintenance, forestry, transportation, power, mining, and countless others. A great number of these markets are just beginning to realize the potential uses of private radio for applications such as patient monitoring, inventory control, process monitoring and automated operation; all of which would be difficult to conduct with commercial services. Private systems play a unique and vital role in support of our nation's economic and industrial sectors. However, in recent years the spectrum requirements of the Private radio user community have been overshadowed by the emergence of innovative and popular, consumer-based wireless services, leaving the Private user with few spectrum options.

9. In the 1993 Omnibus Budget Act, Congress amended Section 332 of the Communications Act of 1934 ("the Act") and directed the Commission to create regulatory parity among wireless Common Carriers and certain private wireless licensees that were providing service that was substantially similar to Common Carrier Service.[3] In response, the Commission developed the broad definitions of Commercial Mobile Radio Services ("CMRS") and Private Mobile Radio Services ("PMRS").

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[3] *See* 47 U.S.C. §§ 151-614 (Communications Act of 1934 as Amended).

10. The regulatory structure that the Commission has adopted for CMRS has been wide-area geographic licensing and a system of competitive bidding for the resolution of mutually exclusive applications. Insofar as this policy has been implemented for newly allocated CMRS spectrum, it has been largely successful. However, because the Commission has begun to apply this regulatory structure to the CMRS that were formerly licensed as PMRS' and because these CMRS systems have been licensed on bands of spectrum that are heavily occupied by systems that remain PMRS, the Commission has effectively removed large blocks of spectrum from PMRS allocations (*see* Sec III, D, *infra*). Further, because the Commission has been able to raise substantial revenues for the Federal Treasury through the auctioning of the electromagnetic spectrum, it has been hesitant to allocate any spectrum on a non-auction basis.

11. In 1997, Congress again amended the Telecommunications Act and redefined the Commission's competitive bidding authority.[4] Prior to the 1997 Amendments to the Act the Commission could only resolve mutually exclusive applications through a process of competitive bidding when "the principal use of such spectrum will involve, or is reasonably likely to involve, the licensee receiving compensation from subscribers. . ."[5] This unambiguous language made all PMRS wireless applications exempt from competitive bidding. Under the Commission's revised auction authority, the exemption from auctions is limited to "public safety radio services." However, such services are defined to include "PMRS internal radio services" that "protect the safety of life, health and property."[6] While the 1997 amendments to the Act may have, arguably,

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[4] *See* 47 U.S.C. § 309(j)(2)(A)(1997).

[5] 47 U.S.C. § 309(j)(2)(A)(1996).

[6] 47 U.S.C. § 309(j)(2)(A)(1997).

limited the class of applicants that are inherently exempt from auctions, nothing in the 1997 amendments altered the fundamental, specifically enumerated limits on the Commission's competitive bidding authority.

12. Under section 309(j)(4)(C) of the Act, the Commission -- in designing a system of competitive bidding -- is charged by Congress to consider "the characteristics of the proposed service" in order to "prescribe area designations and bandwidth assignments that promote (i) an equitable distribution of licenses and services among geographic areas, (ii) economic opportunity for a wide variety of applicants, including small businesses."[7] Even the most superficial analysis of the "character" of PMRS "service" reveals that wide-area geographic license "designations" are an inappropriate method for the assignment of PMRS wireless licenses. Because PMRS systems are inherently designed for the service of small or distinct geographic areas (typically, less than 1,000 square miles and often fractions of a square mile, in the case of low power operations), the wide-area model applied for CMRS systems is inapplicable. By their very nature PMRS systems require site-by-site licensing.

13. The Commission's competitive bidding authority is further restricted by Section 309(j)(6)(E) of the Act, which states that nothing in the statute should "be construed to relieve the Commission of the obligation in the public interest to continue to use engineering solutions, negotiation, threshold qualifications, service regulations, and other means in order to avoid mutual exclusivity."[8] By implementing wide-area geographic licensing schemes for PMRS applicants, the Commission not only fails to make any attempt to avoid mutual exclusivity, it actually creates

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[7] 47 U.S.C. § 309(j)(4)(C).

[8] 47 U.S.C. § 309(j)(6)(E).

mutual exclusivity where it does not naturally exist. In the case of shared spectrum, mutual exclusivity will never exist, because multiple applications for the same frequency may be granted.[9]

14. The great majority of PMRS wireless systems exist in a shared or coordinated environment. Under this licensing scheme, the Commission's certified frequency advisory committees are charged to coordinate pending applications and to recommend frequency assignments that will minimize adjacent and co-channel interference both to and from incumbent licensees. In a shared environment, the coordinating committees select frequencies based on the lowest acceptable level of system degradation. As a result mutually exclusive applications are not filed, and auctions are never an appropriate licensing mechanism in this context.

15. Because the current spectrum allocation environment promotes the development of CMRS at the expense of PMRS, a spectrum shortage crisis has emerged in the PMRS industry. Numerous examples can be given of the impact of this spectrum shortage on PMRS users. For example, the owner of a start-up limousine company that serves the Brooklyn, New York, area reports that the lack of available spectrum is prohibiting the growth of his business. Like other small non-communications business owners, he found the prospect of entering an auction entirely unrealistic. As a result, he is forced to use a heavily congested, shared UHF channel. Common waits of 10-15 minutes for a clear channel regularly delay the dispatch of his drivers. During the many peak times of the day and night when no open channels are available, he is forced to use a CMRS system that is not only dramatically more expensive but does not provide dispatch service.

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[9] In a shared spectrum environment, the grant of one application does not preclude the grant of additional applications on the same frequency at essentially the same location. Co-channel licensees are required to monitor the channels on which they are licensed, and may only access the channel when it is not in use by other co-channel licensees.

16. Users of two-way radios at all of the ports of entry around the country are placed in danger on a daily basis due to the lack of available spectrum. The entire process of unloading 5,000-ton cargo boxes from 80-foot tall vessels onto holding docks, and again onto trains or trucks for distribution is coordinated through the use of two-way radios. In the Los Angeles port authority alone, tour to five cargo ships are typically loading and unloading cargo at the same time with each terminal requiring as many as 16 different frequencies for crane operators, top handlers, side handlers, yard handlers, and superintendents use to ensure the safe transfer of cargo. Currently, port authorities use shared UHF frequencies for these critical operations, which are often obstructed due to the increased congestion on these channels. This congestion can, and does, bring life-threatening consequences when operators hear "Drop it!" from other nearby users and mistakenly believe the command was intended for them. Two deaths in the Los Angeles port in the past 90 days were the results of this type of mix-communication from a shared channel. Given sufficient spectrum, these disasters could be avoided, as frequency advisory committees could ensure that no two stevedore operations were licensed on the same channels.

17. A major airline reports that traffic has been growing at a rate of 4% per year in the U.S. and that cargo traffic is expected to grow at a 20% rate. The amount of spectrum available to them, on the other hand, has not grown at all in the last 30 years. Pressures of the economy require greater efficiency and increased productivity of airlines, making dispatch radio even more heavily used. All airlines use two-way radios to manage personnel safety and maintain an acceptable level of customer satisfaction. However, as the spectrum shortage grows, levels of service and safety drop.

18. Public Service Electric & Gas Company ("PSE&G"), headquartered in Newark, NJ,

suffers from a severe lack of available MAS and telemetry spectrum used for meter reading and remote control purposes. Due to this lack of spectrum, the gas company is forced to use public carrier services, which increase their operating costs by roughly $1.2 million per year. In addition to the incremental costs, the service from these public carriers is unreliable, as they now must compete for channels with all other users. In the event of any emergency, such as bad weather, traffic jams and traffic accidents when cellular use increases, the ability of PSE&G to perform critical operations that protect the safety of the general public may be compromised.

19. These examples of the real world effect of the PMRS wireless spectrum shortage are repeated again and again in industry after industry across the entire nation. Accordingly, the LMCC urges the Commission to adopt policies that not only address this spectrum shortage but also recognize the vital role that PMRS radio systems play in the U.S. economy, as well as the unique licensing requirements of these systems.

III. Spectrum Requirements of the PMRS Community

20. The needs of the PMRS wireless community have been well established in a number of government agency and industry reports.[10] While these reports come from a variety of perspectives, they reach remarkably similar conclusions due to changing demographics, regulatory developments, and technological advancements, there is a drastic shortage of spectrum

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[10] *See Report of the Spectrum Planning and Policy Advisory Committee Task Force on Federal Government Spectrum Relocation Implementation* (released August 7, 1997) *(SPAC Report*); *PMRS Land Mobile Services: Background*, Wireless Telecommunications Bureau Staff Paper (released December 18, 1996) (*Wye Report*); *Land Mobile Spectrum Planning Options*, NTIA Special Publication 95-34 (released October 19, 1995) (*Second NTIA Report); U.S. National Spectrum Requirements: Projections and Trends*, NTIA Special Publications 94-31 (released March 1995) (*First NTIA Report*); *Petition for Rule Making*, filed by the Coalition of PMRS Users of Emerging Multimedia Technologies (filed December 23, 1993).

available for PMRS licensees.[11]

A. Congestion on Existing Allocations

21. In 1995, the National Telecommunications and Information Administration ("NTIA"), under a mandate from Congress, initiated a *Strategic Spectrum Planning Program* and issued a two-volume report on future spectrum requirements. The first volume of this report found that while there was a wide-spread need for additional spectrum across nearly all wireless services, the most critical need was for the land mobile services.[12] The NTIA study also found that spectrum requirements for the PMRS wireless community would double over the next 10 years.[13]

22. The second volume of the NTIA study focused on land mobile spectrum needs and attempted to quantify the level of congestion on existing allocations. To effect this quantification, the NTIA produced a Spectrum Use Factor ("SUF") that measures spectrum congestion in a given geographic area. These SUF numbers range from below 0.2 -- least congested -- to 0.8 and above -- most congested.[14] The NTIA report included a set of maps illustrating the nationwide levels of spectrum congestion in different PMRS bands, which is attached at Appendix A.

23. In the frequency ranges most heavily used by PMRS wireless licensees, the NTIA

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[11] This petition seeks additional allocations for PMRS; however, the LMCC recognizes that there are operators of localized, primarily dispatch systems that, because they offer minimal interconnection, are currently classified as CMRS providers. As the FCC further develops its use of the CMRS "covered carrier" definition adopted in the E-911 proceeding (CC Docket No. 94-102), the characterization of "non-covered carriers" may prove better suited to define eligibility for the allocations sought herein.

[12] *First NTIA Report*, at 33.

[13] *Id* at 34.

[14] *Second NTIA Report*, at 2-4.

report found very heavy congestion. For the frequency range between 450-470 MHz, NTIA found that for large areas of the country, most notably the eastern half of the United States and the three westernmost states, spectrum resources in the band were at the maximum level of occupancy, 0.8 and above. Similar findings were made with regards to the 800 MHz band. An analysis of the VHF bands indicated slightly lower levels of congestion nationwide; however, certain urban areas showed maximum spectrum usage levels.

24. An independent analysis conducted by the LMCC echoes NTIA's findings and is summarized in Appendices B, C, D, and E. Included in this analysis, and attached in Appendix B, is a review of available channels in the most heavily relied upon PMRS wireless bands. As discussed below, the UHF (450-470MHz, 470-512MHz), and 800 and 900 MHz bands constitute the backbone of the nation's PMRS wireless networks. In the top 10 urban markets reviewed, no PMRS channels are available in the 470-512, 800, and 900 MHz bands. Channels are available on a shared basis in the 450-470 MHz band, however most available frequencies support between five and 10 co-channel licensees, with some channels supporting as many as 15 co-channel licensees, each employing potentially hundreds of mobile units. The result of this heavy occupancy on these shared channels is that communications quality and reliability is sorely compromised. Because of either technical limitations or extreme congestion, nearly every band of spectrum currently allocated for PMRS use is at the limit of its useful application.

i. Low Band VHF (25-50 MHz)

25. The VHF Low Band is basically not useable in urban areas, because building penetration is poor. Interference can be severe from long-range interfering signals, and substantial man-made noise interference predominates in the built-up urban areas. Because of the low

frequency, antennas tend to be very large, and when made small enough for reasonable portable products, they become inefficient. Since the band is not structured on a paired frequency basis, simultaneous transmit-receive is not possible.

ii. High Band VHF (150-174 MHz)

26. The VHF High Band is substantially more useful though still not optimum in urban areas. There is little long range interference, less man-made noise and shorter antennas, which in turn allow more efficient design. Building penetration is improved over low band but is still marginal. Again, with no inherent frequency paired band structure and still relatively long wavelengths, mobile duplex capability is generally impractical.

27. Overall, both low and high band VHF licenses are assigned on a time-shared, or non-protected service area ("non-PSA") basis. That is, there are no physical minimum spacing distances regulated between co-channel systems. This has historically resulted in the efficient use of the spectrum, i.e. more users per megahertz in a given geographical area. However, because of drastic spectrum shortages in high-demand urban areas, more and more users are packed into a given area. This overloading results in the degradation of the fundamental quality of the communications. With little or no on-going monitoring of this quality level, overall communications quality degradations are hidden from view.

28. Furthermore, this non-PSA basis generally precludes use of some newer technologies, such as trunked systems, while also limiting potential for "guaranteed" higher reliability applications, such as critical data links. Finally, the Commission in its "refarming" proceeding,

has begun a transition from 15 kHz channels to 7.5 kHz channels.[15] While this narrowbanding presents the potential for increased spectrum capacity, transition delays and interference problems limit the potential benefits (*see* Sec. III, B, *infra*).

29. For a number of reasons the 450-470 MHz UHF band is considered by many to be the urban "work-horse" band. Most importantly, the paired frequency structure of the band allows reasonably straightforward implementation of duplex base station and repeater configurations. However, the relatively small 5 MHz spacings between the pairs generally disallows full duplex portable radios. Applications that might benefit from full-duplex links, data for example, are generally unavailable.

30. Since license assignments in this band are also on a non-PSA, time-shared basis, extreme congestion in the band has resulted in a continuously degrading level of communications quality, due both to co-channel and adjacent channel interference as well as the increased interference noise floors.

31. As in VHF, the "refarming" proceeding sets a strong direction toward licensing of only narrower channels. The transitional concerns are heightened due to the fact that this is the urban "work-horse" band, with more complex repeater systems in place. Further, whereas the VHF transition is to be a one-step process (15 kHz to 7.5 kHz channels), the UHF band will experience a two-step process, moving first from 25 kHz to 12.5 kHz, then subsequently to 6.25 kHz. However, the perceived 4:1 packing density increase will not be attained for decades due to

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[15] *See In the Matter of Replacement of Part 90 by Part 88 to Revise the Private Land Mobile Radio Services and Modify the Policies Governing Them*, PR Docket No. 92-235.

the need for a reasonable transition period for existing equipment (*see* Sec. III, B, *infra*).

iv. UHF (470-512 MHz)

32. The 470-512 MHz band also qualifies for urban "work-horse" status, for the same reasons as the 450-470 MHz band. Unfortunately, the band is only available in 11 cities, with either 6 or 12 MHz assignable. All of the other 450-470 MHz characterizations apply here, except for the fact that this band was originally implemented with system spacing rules designed to provide protection, albeit extremely conservatively, to shared spectrum TV systems.

33. Communications quality levels are generally higher in this band due to the pseudo-PSA nature of the assignments. However, it is probable that the band will ultimately yield considerably less "refarming" packing density increase, due to these same regulatory restrictions, but will tend to maintain the higher quality communications.

v. UHF (421-430 MHz)

34. This band was put in place in three cities, Detroit, Cleveland and Buffalo, where 470-512 MHz was not available due to Canadian border (TV) restrictions. As such, all 470-512 MHz characterizations apply.

vi. 800/900 MHz

35. This is another urban "work-horse", with very good building penetration and smaller, efficient antennas that offset slight propagation loss penalties as compared to UHF. Frequency pair spacings of 45/39 MHz allow full duplex portables in small size and at low cost. There is extensive use of repeaters in these bands, though much of the mobile use, both SMR and non-SMR, is still half-duplex for dispatch applications.

36. PSA license assignments have made implementation of trunked system technology

possible, which in turn has expanded use of shared PMRS systems for smaller users. Large PMRS users also use trunking to gain access to advanced features, such as call groups, that are not generally available in conventional systems.

37. Competitively driven SMR consolidation is underway, and the FCC is in the process of auctioning off any remaining "white space" to CMRS service providers, leaving no opportunity for additional urban licensing of PMRS systems (*see* Sec. III, D, *infra*).

B. "Refarming" will provide limited relief

38. In calculating the amount of spectrum that the PMRS wireless community will require, the NTIA estimates that technological advancements, such as the transition to narrowband equipment, will alleviate some of the congestion in existing allocations and will maximize the relief any new allocations will provide. However, early experience with the implementation of the "refarming" proceeding shows that the transition to narrowband channels will provide only limited relief.

39. Time sharing of channels in a given geographic area is very spectrum efficient for multiple small users, but only when their modes of operation and technology use are quite similar. Mixing isochronous voice and asynchronous data services has always been a problem, engendering channel monitoring issues. Generally the "solution" was to depress the use of data, an important application for PMRS users. Mixing transmission technologies, i.e. analog and digital voice, is also problematic and will become more common in the "post-refarming" environment. Similarly, mixing different channel bandwidths also causes substantial compromises and, eventually, when all bands are narrowed, yields greater adjacent channel interference levels.

40. The net effect is that "refarming" with 4:1 channel splits cannot ultimately yield a 4:1

user capacity increase. Unless it is assumed that the overall communications quality level may be degraded, a 3:1 capacity increase is more likely. Attached at Appendix C is a projection of the capacity increases that will be achieved through the transition to narrowband equipment. This analysis projects only a 2:1 capacity increase as far out as 2010, with the full benefits of "refarming" not approached until 2020.

41. This is not to say that the "refarming" initiative is inherently flawed but, rather, to recognize that the process is one of attempting to keep pace with, rather than effectively solve, the spectrum shortage problem. In addition, it should be clear that any definition of "spectrum use efficiency" or "capacity" requires that some communications quality level reference be put in place and maintained constant for comparison purposes.

42. When PMRS began to develop serious spectrum shortages in urban areas, rather than supplying additional spectrum to meet the needs of applicants, the solution has been to increase the number of co-channel systems licensed on a given frequency. The net effect has been that "efficiency" was theoretically improved through forced degradation of communications quality -- more and more units packed into a given geo-spectrum space.

43. Thus, one major component of the PMRS spectrum shortage problem is the need to achieve and maintain some acceptable level of communications quality for the industry that is generally higher than the level in many urban areas today.

C. Need for spectrum for broadband applications

44. While new technology will alleviate some of the congestion problems facing the PMRS community, it may actually exacerbate the problem to a certain extent. New applications are available for PMRS uses that promise to greatly enhance the efficiency of many businesses

currently implementing PMRS systems. However, many of these applications require access to broadband channels. Examples include:

- GPS location devices for the tracking and mapping of delivery, taxicab and livery, and security services.
- Mobile facsimile services for the transmission of text and images.
- Data capabilities for document processing such as customer database information, messages, files, etc.
- Data capabilities for production processes such as inventory tracking, production cycles, shipments to billing changes on customer files.
- Image transmission of still photographs such as real estate properties.
- Slow scan video transmission of images, and full motion video for coordinating activities such as heavy construction in progress.
- Telemetry devices for monitoring, signaling, or stopping and starting automated operations.
- Connection capabilities to PBX and or outside cellular systems.
- Remote interface with internal computer LAN systems, corporate intranet, and the Internet.

45. The hallmark of the PMRS industry is that it is an important tool for American industry and for the safe operation of the nation's critical infrastructure. PMRS licensees do not operate their systems as a source of revenue but rather as a means of supporting the day-to-day needs of their businesses to protect the safety of their employees, customers, and the general public, and to effectively complete in a global market place. As new applications for PMRS use become available there is the potential for wide-spread benefits across the economy. However, if adequate spectrum is not available for the implementation of these new applications, important opportunities will be lost for the American consumer, and American industry will lose a competitive advantage. To a certain extent this undesirable outcome is already being realized across a broad cross-section of industries and services.

46. Attached at Appendix D is an analysis of the projected penetration of these advanced services. Starting as early as the year 2000, demand for advanced services will begin to appear in

traditional markets. These new services promise significant benefits to nearly all aspects of industry but will require additional spectrum for this promise to be realized.

D. Reallocation of PMRS Spectrum to CMRS use

47. In addition to the growing need for spectrum for new services, and to accommodate future growth of traditional services, the spectrum shortage crisis has been aggravated by regulatory changes. As discussed at paragraphs 9-15 *supra,* bands of PMRS spectrum have been reallocated for CMRS services and slated for auction.

48. In 1991, a portion of the 220-222 MHz band was allocated by the FCC for "non-commercial" nationwide land mobile radio systems. This new band presented the opportunity for new and innovative PMRS applications. For instance, a consortium of approximately 30 utility companies filed applications to develop a nationwide not-for-profit radio system that would be used by the utilities to meet their internal day-to-day needs for dispatch communications, as well as interoperation between utility crews responding to a widespread emergency. However, these innovative PMRS applications never got the chance to develop, because the FCC never acted on these applications. Finally, in 1997 the FCC decided to eliminate the "non-commercial" set-aside, to return the applications filed in 1991, and to hold auctions for these channels among new applicants.[16]

49. In the 800 MHz band, PMRS systems have had a major presence since the band was first allocated and assigned in the 1970's. However, in PR-Docket 93-144, the Commission began

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[16] *220 MHz Third Report and Order,* PR Docket No. 89-552, (released March 12, 1997).

the process of introducing geographic licensing to the CMRS services in the 800 MHz band.[17] Initially the Commission decided to split the 800 MHz band into two "pools." The Commission established 200 channels for CMRS use to be assigned by geographic licenses and auctions and reserved 230 channels for small dispatch and "General Category" systems to be licensed on a site-by-site basis.[18] However in the *Second Report and Order* in this proceeding, the FCC reconsidered its decision to license the 230 channels on a site-by-site basis and announced an auction for geographic area licenses for these channels.[19] The inevitable result of this decision is that all future access to the "General Category" channels in the 800 MHz band will be limited to large CMRS auction winners. Even though there is no mandatory relocation of incumbent PMRS licensees in the pending auction of the "lower 230" 800 MHz channels, these incumbents will be pressured to vacate their license holdings. The reality of the business plan of the eventual auction winner will almost certainly require the relocation of these incumbent systems. Without additional spectrum being made available for their relocation, PMRS licensees in this band face uncertainty at best.

50. Additional bands that are being reassigned from PMRS to CMRS use include 900 MHz Multiple Address Systems ("MAS") bands. MAS are point-to-multipoint systems operating in the 900 MHz band which are used by utilities, pipelines, and oil and gas production systems for various telemetry and control functions, including system monitoring, distribution system control,

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[17] *First Report and Order*, (FCC 95-501), PR Docket No. 93-144, 61 Fed Reg. 6138 (1995).

[18] *Id.*

[19] *Second Report and Order*, (FCC 97-233), PR Docket No. 93-144, adopted June 23, 1997, released July 10, 1997.

load management, and nuclear warning sirens. And while MAS are depleted in many areas of the country, industry need for these channels is increasing. This demonstrated demand prompted the FCC to open a new band of MAS channels in 1992. However, the FCC has apparently aborted its efforts to satisfy the strong PMRS need for these channels. Instead, the FCC has initiated a rule making to dismiss all pending PMRS applications, and to declare MAS to be a "commercial" service subject to wide-area geographic licensing and auctions.

51. Interservice sharing of the Maritime channels with Industrial/ Land Transportation licensees in areas away from navigable waters was granted in 1996.[20] This interservice arrangement provided much needed spectrum relief in the bands below 800 MHz, without any ill effects on the maritime services. However, in 1997, the Commission froze all interservice applications in anticipation of the wide-area geographic licensing and auctioning of the maritime channels and effectively ended interservice sharing opportunities on these bands.[21]

52. As the Commission has emphasized the CMRS services, there has been a prevailing school of thought that PMRS needs can be fully satisfied by CMRS service providers. This belief is misguided. In fact, while nearly all large PMRS licensees maintain contracts with CMRS providers for some of their communications needs, PMRS licensees have additional unique needs that cannot be met by CMRS providers.

IV. PMRS Needs vs. Commercial Services

53. PMRS users own and operate complex communications systems to provide effective

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[20] *See In the Matter of Amendment of the Commission's Rules Concerning Maritime Communications, First Report and Order,* PR Docket 92-257, 10 FCC Rcd. 8419 (1996).

[21] *See Second Report and Order*, PR Docket 92-257, (adopted June 17, 1997, released June 26, 1997).

internal communications among team members, operate complex machinery, and monitor remote equipment, among other uses. These internal communications are critical in ensuring the execution of operational and administrative objectives such as improving efficiency and productivity, enhancing the safety of employees and the public that they serve; and improving the responsiveness to the needs of their customers. While PMRS users subscribe to CMRS services such as cellular and paging in order to meet some of these objectives, it is impractical and often impossible for CMRS services to meet all of the their needs independently.

54. PMRS communications systems are generally designed to serve the specific, unique communications needs of the operator of the system. In contrast, CMRS systems are designed to provide a range of services that will appeal to a much broader base of users. As stated in the *Wye Report*, "in many cases, PMRS users represent a thin and unique market that CMRS providers have little incentive to invest in to serve; there is usually not enough of a return involved to justify the capital investment to serve one or a few PMRS customers."[22] Therefore, PMRS users have a number of unique requirements that cannot be met by CMRS. These are discussed at length below:

A. Immediacy/Priority Access

55. PMRS users rely on their ability to communicate among work teams instantaneously in order to coordinate daily activities, as well as control emergency situations. The timing of these coordinated communications is critical in many environments and could endanger the safety of the team or the public if delayed for even a fraction of a second. Priority access is particularly necessary during disasters and emergencies when public telecommunications circuits are often

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[22] *Wye Report* at 23-24.

severed or jammed with calls. Citing an example of "communications gridlock in a *Petition for Rule Making* regarding cellular priority access for public safety; National Communications Systems points out that immediately following the Oklahoma City bombing incident, "local response teams were having difficulty communicating when using cellular telephones." [23]

56. Another life threatening example of the need of PMRS users to have immediate access to open communications channels occurred in July 1995, when a Conrail police officer observed a trailer hanging over the side of a flatcar on a passing train. The officer was able to contact the train engineer by private radio in time to have the train stopped before reaching a tunnel. But for the ability to communicate this information quickly by radio, the trailer would have struck the wall of the tunnel upon entry, causing a major derailment. Even in less critical situations, the ability of users to prioritize calls is an integral part of their day-to-day operations. CMRS services, on the other hand, are not capable of prioritizing one customer's call over all others.

B. Control

57. Having absolute control over their communications network is essential for many PMRS users. This includes having the ability to monitor and coordinate day-to-day operations, as well as respond to emergency situations. As stated in the *PMRS Land Mobile Communications Requirements of Passenger and Freight Air Carriers at Airports* report, airline companies are significantly impacted by radio communications and equipment failures.[24] These failures present

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[23] In the Matter of Cellular Priority Access for National Security and Emergency Preparedness Telecommunications, *Petition for Rule Making*, WT Docket No. 96-86, filed by National Communications System, October 19, 1995.

[24] *See PMRS Land Mobile Communications Requirements of Passenger and Freight Air Carriers and Airports*, report of the ARINC Aeronautical Frequency Committee, (rel. September 30, 1996) (*ARINC Report*).

an air carrier with the risk of major disruptions to aircraft processing and possible outages if not remedied immediately:

> Two-way radio communication provides air carriers the ability to exercise precise tactical control over several thousand personnel who are necessary for the operation of a major air terminal. This control requires very intense and in-depth communication transactions which must be accomplished quickly and reliably . . . Two-way radio systems at major airports are complex systems which require many channel assignments in order to provide needed capacity and some degree of isolation and division of function.[25]

As a consequence, most airlines staff their own radio maintenance facilities at major airports so that they can exert full control over maintenance and restore activities. This is a recurring cost commitment on their part, but one which is fully justified by the economic risk inherent in a radio system outage.

58. A PMRS user's control over its network could also be severely inhibited under a CMRS service contract should the carrier change its network, merge with or acquire another company, or cease doing business altogether. Continual increases in access charges or usage rates could also lessen a user's ability to control financial expenditures for its communications network.

C. Capacity

59. PMRS users require flexibility in their communications systems to handle the need for increased capacity during peak periods of operations. Requirements for increased capacity vary dramatically from one type of PMRS user to another. Some PMRS users require additional capacity only at certain times of the day week or month, while others have several peak operating periods throughout the day. In a study of airline carrier usage, several five-channel systems were observed to have peak sustained channel request rates as high as 1,000 dispatches per hour over a

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[25] *Id.* at 37.

15-30 minute period against a longer-term background rate of approximately 600 dispatches per hour over several hours.[26] While air carriers make the economic commitment to pay extra for systems that accommodate these peak; periods, common carrier operators would be unlikely to make such an investment.

60. The extent of increased capacity during peak periods also varies from user to user. The International Taxicab and Livery Association (ITLA) for instance, found in a recent study that over 5,600 one-way transmissions are executed during an average peak busy hour. In fact, many PMRS systems are engineered to handle more capacity than CMRS systems. This capacity is necessary for PMRS users to coordinate their activities in responding to emergencies or natural disasters. During these emergencies, PMRS users perform an invaluable public service and must be guaranteed sufficient capacity to effectively deal with these life threatening situations. PMRS users that are in control of their own systems can administer flexibility and accommodate peak operating periods by accessing additional channels that are shared with users whose activities decrease during this same period.[27] CMRS service providers, in contrast, normally design their networks to accommodate only the average capacity requirements for their total customer base and are unlikely to invest in ways to meet unique requirements for individual users such as these.

D. Reliability

61. Many Federal Government, state and industry agencies mandate safety compliance regulations for PMRS users that require highly reliable communication systems for day-to-day

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[26] *Id.* at 33.

[27] Comments of the International Taxicab and Livery Association, prepared by BIA Consulting, (submitted in response to *Request for Comment for Wye Report*), May 10, 1996, pg.5 (*ITLA Comments*).

operations as well as for emergency situations or disaster recovery plans. A number of the requirements were detailed in the written testimony of several railroad, utility, and petroleum industry associations to the Senate Commerce Committee.[28] Under the Pipeline Safety Act, for example, emergency response plans for gas pipelines must include reliable communications with fire, police and other public safety officials.[29] The North American Electric Reliability Council (NERC) standards also require reliable and secure telecommunications networks and the use of exclusive communications channels between the systems and control centers of adjacent electric systems.[30]

62. The Federal Emergency Management Agency (FEMA) requires reliable primary and backup means of communications between a nuclear facility and tile utility's near-site emergency operations facilities, state and local emergency operations centers, radiological monitoring teams and the Nuclear Regulatory Commission.[31] Reliability of these communications systems must be demonstrated under emergency conditions that would overwhelm public or third party systems. Reliability means having continuous communications throughout an area of operation, whether that area covers all levels of a plant facility or connects multiple geographic regions required for users such as railroad and utility companies. CMRS services cannot provide reliable coverage for many PMRS users due to coverage limitations. For example, in the San Francisco Bay area, the

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[28] *See* Written Statement on Behalf of the American Gas Association, *et al.* Before the Senate Commerce Committee, April 18, 1996.

[29] *Id*.

[30] *Id*.

[31] *Id*.

California State Automobile Association has its emergency road service dispatcher linked directly to the local emergency dispatch, so that police officials can dispatch emergency road services without delay. Cellular use during a serious freeway accident can spike upward so significantly that this cooperative dispatch response by police officials and the automobile emergency service would be impossible if the auto club were forced to employ CMRS services.

E. Equipment Requirements

63. Many PMRS users who need to communicate within environments that could become hazardous are required by law to use only equipment that meets certain safety standards. Petrochemical users, for example are required to operate with only Factory Mutual Approved intrinsically safe radios (which are designed not to spark when activated) for communications in explosive environments such as oil refineries. Currently, CMRS service providers do not offer intrinsically safe equipment and, therefore, cannot be used in these environments where communications are vital. The Rail Safety Enforcement and Review Act of 1992 requires the installation of two-way end-of-train devices, allowing coordination of movement between the locomotive and the rear of the train.[32] The Federal Railroad Safety Act of 1970, as amended, requires the Secretary of Transportation to prescribe regulations and issue orders regarding rail safety, and Congress has mandated to the Secretary of Transportation to require the railroad industry to deploy two-way radio links for the initiation of emergency braking from the rear of a train.[33]

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[32] *Id*.

[33] *See* 49 U.S.C. § 20141(b).

F. Geographic Requirements

64. PMRS users require communications in even the most remote areas of the country where CMRS networks cannot provide coverage. The forestry industry, for example cannot be served by cellular or PCS devices as propagation characteristics make penetration for those technologies in dense wooded areas difficult, if not impossible. Other rural or remote areas are not serviced by CMRS systems as carriers tend to build out in densely populated areas where they can maximize their investment returns. While CMRS service providers are expanding their networks to some smaller metropolitan areas, many rural areas may never have access to these services. This eliminates the possibility for some PMRS users such as railroads, to deploy communications across wide geographic areas that encompass both major metro and rural areas. In a recent study conducted by Motorola, more than half of the non-public safety, PMRS system users surveyed stated that existing cellular service provided insufficient coverage to meet their needs.[34] Most of these respondents cited cellular's insufficient coverage in rural areas while the remainder expressed concern about in-building penetration or regional service needs.[35]

65. Even in areas where CMRS services are available, a user may be required to contract with multiple carriers in order to provide adequate coverage for its area of operation. A large public utility for instance, may provide service over several states. In order for that utility to have seamless coverage across its service area, it would need to negotiate service contracts with multiple CMRS providers. Each provider may employ different equipment, adhere to different

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[34] Motorola White Paper*: Characteristics of PMRS Land Mobile Radio* (submitted in response to *Request for Comment for Wye Report*), May 13, 1996.

[35] *Id*.

standards, or offer different services, making seamless coverage impossible. This poses a particular problem for PMRS licensees such as railroads, whose communications equipment must be interoperable along railway systems that may cross the entire country. In addition, variations in service charges and plans, contract terms and other expenses would make forecasting and controlling finances virtually unmanageable.

66. American business and industry vitally depend on PMRS systems. CMRS carriers are simply not able to satisfy the many specialized requirements encountered in the business marketplace. Companies like Toyota, Weyerhaeuser, Coors, Boeing and Corning, among others, have concluded that CMRS systems will not satisfy their needs. In addition, critical infrastructure industries such as pipelines, utilities, and the railroads cannot entrust their crucial public safety communications needs to CMRS providers which may not provide the reliability required in life-threatening emergency situations. Carriers will not provide assurances of reliable coverage within plant facilities, or over wilderness timberlands; will not provide assurances of access in the event of disasters; and will not guarantee system reliability compliant with military contract specifications. In short, business and industry will continue to rely upon PMRS communication systems and require continued spectrum allocations to accommodate their needs.

V. Future Quantitative Spectrum Requirements and Options

67. The spectrum requirements analysis conducted by the LMCC reveals that future additional spectrum needs of the PMRS community are as follows: 15 MHz by the year 2000, 44 MHz by 2004, and 125 MHz by 2010 (44 MHz is inclusive of the 15 MHz, and the 125 MHz is

inclusive of the 44 MHz).[36] However, there is, not unexpectedly, a dearth of spectrum that might be used to satisfy the urgent immediate needs of the non-public safety PMRS, as well as the year 2010 needs. Therefore, the LMCC recommends the following:

- Immediate needs be satisfied by a reallocation of 420-430 MHz, paired with 440-450 MHz, from Federal use to PMRS;
- Immediate/mid-term needs be satisfied by FCC allocation of 1390-1400, 1427-1432, and 1670-1675 MHz to PMRS, pursuant to its reallocation to the private sector from the government;
- Reallocate 85 MHz of the aeronautical band, 960-1215 MHz, to the PMRS by the year 2010 to satisfy longer term needs, shared with the developing DOD JTIDS/MIDS service. [37]

A. Recommendation Comments

68. These recommendations are based on the LMCC's best assessment of the threshold characteristics of spectrum appropriate for allocation to the PMRS industry. First, this analysis was limited to the bands below 2 GHz. Because of the substantial increase in propagation loss, reduced maximum safe transmitter power levels, and increased difficulty in creating small, low cost products, spectrum at higher frequencies is generally unusable for PMRS use. Second, bands of spectrum that are reasonably close to existing PMRS allocations are preferred. An allocation of spectrum located too far from bands where existing equipment operates would require a

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[36] The details of this analysis, and a description of the methodology employed are included in Appendices C, D, and E. In order to provide a common frame of reference, the methodology employed in the LMCC's analysis is substantively similar to that employed in the PSWAC Report.

[37] In important association, it is also recommended that an additional 70 MHz of this band be reallocated to PMRS public safety services, in order to satisfy their projected year 2010 needs. The remaining 100 MHz would be generally devoted to on-going aeronautical needs, such as perhaps air-to-ground data links, remaining use of collision avoidance systems (at 1030 and 1090 MHz) and possible GPS enhancements.

lengthy and more costly equipment development process to be completed before such spectrum could be put to use. Last, the LMCC selected bands of Federal Government spectrum that were likely to become available as a result of evolutionary changes in Federal usage, such as military down-sizing and technological shifts. Because partial continued use of such Federal Government spectrum may remain vital, the LMCC embraces the recommendations of the SPAC report and believes that shared spectrum use may be a viable alternative to outright reallocation in some cases. Accordingly, the bands discussed in detail below, are representative of this criteria. However, these are not the only bands that meet this criteria. Additional bands may be appropriate for allocation to the PMRS community.

i. 420-450 MHz

69. As previously noted, PMRS already uses 420-430 MHz in three Canadian border cities. History shows that a substantial number of PMRS systems have been implemented in these cities, with no interference problems, either with Canadian systems across the border or with Federal Government systems in the U.S.

70. A reduction in military use of this band is foreseen and it could be that most PMRS services could co-exist in most significant geographical areas of the U.S., with perhaps PAVE PAWS (Precision Acquisition Vehicle Entry Phased Array Warning System) geographical restrictions in parts of California, Georgia, Massachusetts and Texas.

71. NOAA is experimenting with Wind Profiler use at 449 MHz. Ideally, this should be discouraged or at least minimized, in favor of higher frequency operation (e.g. 915 MHz), if reallocation to PMRS is considered. The band is generally popular with radio amateurs, currently on a secondary basis, with repeater use in 440-450 MHz and satellite links and amateur television

in 430-440 MHz.

72. Because of its closeness to the 450-512 MHz "work-horse" band, existing equipment may be employed for the use of this spectrum. A key reason for pairing the two sub-bands, with a 20 MHz spacing, is to provide for efficient duplex/repeater operations on the fixed ends of systems. If 430-440 MHz were reallocated instead, the spacing would be reduced to 5 MHz, which, though workable (450-470 operations use 5 MHz spacings), increases the difficulties, costs and resultant potential interference problems.

73. It is recognized that these sub-bands are used on a secondary basis by the radio amateur community, as is 430-440 MHz. However, the LMCC believes that the 430-440 MHz sub-band is more important to the amateurs for use in emerging technologies such as links with spacecraft and amateur television applications. Amateur applications in the 420-430/440-450 MHz should remain secondary to PMRS. Furthermore, to the extent that new PMRS advanced services are implemented here, equipment availability and technology would benefit amateurs pursuing such applications as compressed video television in the 430-440 MHz band. Though the most urgent need for PMRS is the more traditional voice and low speed data applications, ultimate band structuring might include a portion dedicated to these advanced services.

ii. l 390-1400/1427-1432/1670-1675 MHz

74. This net 20 MHz of spectrum is targeted for transfer from the Federal to the non-government sector in 1999. However, restrictions on use will remain for some time. Federal operations in the 1390-1400 MHz band will receive protection at 17 sites for 14 years; 1427-1432 MHz will be protected at 14 sites for 9 years; 1670-1675 MHz will be protected at two sites (Wallops Island, VA, and Fairbanks, AK) forever. Many of these protected sites are in key urban

areas such as the east coast and would substantially limit any potential PMRS deployments in those areas.

75. Though this band is not heavily encumbered, it does have significant shortcomings that prevent its immediate reallocation for PMRS users. First there is the issue of restricted availability in many major metropolitan areas. In some cases the restriction may be based more on interference-to-PMRS than the reverse. This may, for instance, be the case for 1390-1400 MHz, where the primary government installations are radar systems. It may be possible to negotiate somewhat smaller restriction areas than are now defined, or otherwise establish PMRS/Federal coordination processes that attempt to minimize these impacts. It may also be possible for prospective PMRS licensees to utilize more advanced technologies to mitigate interference received from government installations during this mid-term transition period.

76. In addition, this band is inherently more costly to implement PMRS systems in, as compared to 450-900 MHz, due to its significantly higher frequency. It has been previously demonstrated that a cost increase of approximately 17:1 would be incurred at 2.3 GHz and, though not currently calculated, system costs for implementation in this band could easily be increased by 4-10 times. Future PCS technology developments in the 1850-1990 MHz band will have some degree of benefit here to reduce costs, but most PMRS systems will not be able to take advantage of very small cell approaches such as will be implemented in PCS, thereby minimizing technology spill-over advantages.

77. Finally, there is currently no PMRS equipment available in this band. Manufacturers will, in most cases, be required to develop entirely new equipment to serve this band. Further, it is not clear what the best structuring of the three sub-bands might be. For instance, splitting 1390-1400

MHz into two paired segments results in an almost impossibly tight 0.36% spacing. The 1390-1400 MHz band will have to be paired with 1427-1432 MHz (2.4% spacing) for half the need, and with 1670-1675 MHz (9% spacing) for the other half. This additional complexity will further negatively impact manufacturer's ability to respond to potential licensee needs.

78. On a closing note for this band, two additional possibilities present themselves. First, the Federal Government, in negotiation with PMRS representatives, might find that some additional nearby spectrum, not currently identified, might be transferred in order to expand the potential utility of this band. Such transfer might, if necessary, envision shared PMRS and Federal use, with associated restrictions but also associated benefits to both parties. It is recommended that such discussions ensue. Also, recognizing that amateur radio service will see a net constriction by the recommended reallocation of 420-430/440-450 MHz, some of this spectrum might be reallocated to amateur service to offset the constriction. This would of course reduce the amount of spectrum reallocated to PMRS but might be of value to speed up net availability of the lower band. For example, 1390-1395/1427-1432 MHz might be allocated to amateur service with 1395-1400/1670-1675 MHz going to PMRS.

iii. 960-1215 MHz

79. The 960-1215 MHz band is allocated to Federal Government aeronautical radio navigation services (Tactical Air Navigation ("TACAN") and Distance Measuring Equipment ("DME")), and is used by both commercial and military aircraft.

80. This large amount of spectrum is structured into 1 MHz channels, with pulse ranging used for determining distance from aircraft to transponders. Aircraft interrogate transponders by transmitting pulse pairs at a given frequency. Ground transponders then respond with similar

pulses on a different frequency. Aircraft determine range by measuring the time delay between interrogation and response. This overall concept is prone to many sources of error and requires care in assigning frequencies to various ground transponders to minimize co-channel and adjacent channel interferences. This distance measuring system has been in place for decades and, when initiated, did not envision the technological advances in Global Navigation Satellite Systems ("GNSS"), as represented today by the global positioning satellites ("GPS"). As a result, the initial planning for the transition from this system to GPS has already begun, as evidenced by the following quotes from the study "Aeronautical Spectrum Planning for 1997-2010":

> Section 3.2.7: Aviation navigation is currently migrating from ground-based navigation systems to satellite-based navigation systems
>
> Section 3.2.7.1: GPS is used extensively worldwide by the DOD and the civilian community and it will be the primary radio navigation system for the DOD, the civil community and others well into the next century [38]

81. It is clear that there is and will continue to be a strong, worldwide movement away from TACAN/DME system use and to GNSS for all navigation purposes, including en route, initial approach and even final approach requirements. It is also noted that the DOD has developed an integrated communications, navigation and identification ("ICNI") capability using spread spectrum technology in the 960-1215 MHz band, known as JTIDS/MIDS, which is being integrated into US military and NATO platforms. This new service is currently implemented on a non-interference to TACAN/DME basis, with coordination by FAA and NTIA and, being spread spectrum, is inherently compatible with the existing services. Consequently, nearly all of this large band that is currently assigned to TACAN/MDE should become available over the next 10 years.

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[38] Document RTCA/DO-937 (released January 27, 1997).

82. It is recognized that the aeronautical navigation services in this band are of considerable importance. On the other hand, it is clear that these services will shift to the new GNSS operations in the not-too-distant future and that this spectrum offers the last chance for PMRS to access spectrum that is both sufficient in scope and low enough in frequency to satisfy foreseeable future needs, including the perceived explosion in demand for advanced, wide bandwidth applications.

83. Based upon a year 2010 non-public safety PMRS total need of 125 MHz, and assuming 35-44 MHz of that need is satisfied via other near to mid-term allocations, 85 MHz of additional spectrum should be reallocated from this band by 2010. In addition, it is recommended that another 70 MHz be reallocated to the public safety PMRS to satisfy their PSWAC report 2010 needs.

84. Over and above the quantitative considerations, this places both non-public safety and public safety services in the same band, where economies of scale and other technology leveraging can occur to the mutual benefit of both. Part of the 85 MHz reallocation would obviously be used to satisfy the existing substantial shortage of spectrum for airline terrestrial land mobile applications in and around airports. These terrestrial airport applications would also benefit greatly from the wide bandwidth advanced services that would be enabled and brought to market in this band, including imaging and real time video transmissions used in the complex logistics of today's airlines and airports.

85. Since it is known that the DOD is investing considerable sums of money to develop their JTIDS/MIDS communications system to operate in this same band, discussions should be held between PMRS and NTIA to determine the best going-forward plan that allows optimization of

both reallocation objectives for 2010. This might even include coordinated efforts at system and product design, such as to benefit the DOD through commercial technology leverage, while at the same time benefiting the PMRS from military technology advancements such as spread-spectrum, or over-the-air reprogramable equipment.

86. The DME channelizations of 1 MHz bandwidth interrogation channel always associated with a specific other 1 MHz bandwidth transponder response frequency, which is always spaced 63 MHz away allows for a transition program of gradual nature. This basically requires a plan wherein the channels targeted for relocation would be terminated from aeronautical use over a period of time. By reducing, the density of navigation transponders, rather than immediately reassigning DME channels, this transition could begin as early as 2003, with transition completion targeted for 2010.

VI. Spectrum Management

A. Sharing of Federal Government Spectrum

87. In keeping with the directive of thc 1997 Budget Act Conference Report, the SPAC Report, and the findings of this petition, the FCC and the NTIA should promote the sharing of government spectrum with PMRS licensees by establishing engineering criteria and a streamlined administrative process for the sharing of government spectrum by PMRS users.

88. The SPAC report of the NTIA notes that Federal agencies face risks of interference problems, as well as hundreds of millions of dollars in costs, from future transfers of government spectrum allocations to the PMRS sector. Efforts to require the deployment of spectrally efficient radio systems and to reallocate Federal spectrum for PMRS sector use will cost more than $460 million. The report notes that permitting PMRS systems and Federal telecommunications services

to share frequency bands could ease these problems. Because of an "ingrained symmetry" between these types of entities, it is likely that the PMRS and Federal Government users would be able to work out mutually compatible methods and rules of sharing. Interference problems and relocation costs would therefore he minimized.

89. In order to avoid unnecessary bureaucracy and to permit the development of service rules in a timely manner, LMCC urges the FCC to establish streamlined licensing rules for the sharing of Federal spectrum. LMCC recognizes that it will need to work closely with NTIA to identify spectrum bands and establish interference criteria. However, the FCC must take action to ensure that spectrum identified for sharing is expeditiously made available for licensing, and applications are processed in a timely manner

90. The FCC must also implement an accelerated administrative process so that, once appropriate Federal bands have been identified, PMRS licensees can gain access to these bands in an expedited manner. Clear, streamlined procedures must be established that allow the sharing agreements reached between the PMRS users and the NTIA to be implemented.

91. LMCC recommends that the FCC follow the example set in WT Docket No. 97-82, the proceeding in which the FCC standardized its competitive bidding processes.[39] In this proceeding, the FCC established its intention to apply certain basic rules to all subsequent proceedings involving applications subject to competitive bidding. The FCC still applies its rules on a case-by-case basis, but the basic rules themselves and the general guidelines pertaining to their application are already established, thereby eliminating the need for a prolonged debate over

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[39] *See* Amendment of Part 1 of the Commission's Rules -- Competitive Bidding Procedures, *Third Report and Order* (FCC 97-413), WT Docket 97-82 (rel. December 31, 1997).

these rules in each proceeding. The same framework could apply to proceedings involving shared Federal-PMRS spectrum. The FCC could establish its intention to apply certain basic rules (site-by-site licensing coordination rules, etc.) to all such proceedings, while retaining the right to tailor these rules to particular bands of spectrum.

B. Technical Issues to Be Addressed in *Notice of Proposed Rule Making*

92. LMCC recognizes that there are other technical issues that must be addressed in a *Notice of Proposed Rule Making* on this issue, including:

- **Construction requirements.** Reasonable requirements mandating that PMRS systems must be constructed within an established period of time will be necessary to prevent spectrum warehousing and to ensure that PMRS spectrum is used efficiently.

- **Interference standards.** Sound spectrum management dictates that interference standards must be established to prevent interference among PMRS users.

- **Coordination standards.** As has been demonstrated in the PMRS bands below 512 MHz, the PMRS community and PMRS frequency coordinators must work together to establish coordination standards.

- **Efficiency-based licensing criteria.** The FCC should examine whether there are efficiency-based licensing mechanisms including loading or usage requirements, which should be implemented to ensure that this spectrum is used efficiently.

C. The FCC's Licensing Rules Should Be Designed to Meet the Varied Needs of PMRS Users

93. The FCC must establish licensing rules that acknowledge the diversity of communications needs and applications of PMRS licensees. After all it is the unique operating characteristics and the diverse communications applications required that separate PMRS users

from other users. Therefore, LMCC urges the FCC to provide for flexibility in the use of spectrum by PMRS licensees.

94. In particular, LMCC urges the FCC to provide geographic flexibility by licensing PMRS systems on a site-by-site basis. As explained above, predetermined, cookie-cutter geographic areas cannot meet the unique needs of PMRS users. Within the PMRS user community, there is a tremendous variation in the types and sizes of the communications systems needed. For example, industrial users may require the deployment of systems to cover several plants located on one campus. Utilities may require systems covering entire cities or states. Pipelines and railroads may require larger "ribbon" systems that cross state lines but cover no entire states. Site-by-site licensing is the only way to meet the requirements of all these entities.

95. The LMCC also recommends that the FCC avoid adopting unnecessarily rigid rules regarding the types of communications services that can be provided. PMRS licensees should be free to provide a variety of PMRS mobile and fixed services, as long as the proposed services conform to interference criteria and CMRS services are not provided. Such flexibility is in accord with provisions in the recently adopted Balanced Budget Act of 1997, which provides the FCC with authority:

> To allocate electromagnetic spectrum so as to provide flexibility of use, if-
>
> (1) such use is consistent with international agreements to which the United States is a party; and
> (2) the Commission finds, after notice and an opportunity for public comment, that--
> (A) such an allocation would be in the public interest;
> (B) such use would not deter investment in communications services and systems, or technology development; and
> (C) such use would not result in harmful interference among users.[40]

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[40] P. L. 105-33, Sec. 3005.

As long as flexible use does not deter investment in the PMRS band, LMCC believes that flexibility in the licensing of PMRS systems would satisfy the statutory criteria and urges the FCC to address this issue in the *Notice of Proposed Rule Making* on this matter.

D. PMRS Spectrum Should be Managed to Minimize the Need for FCC Resources

96. New PMRS spectrum allocations present opportunities for innovative spectrum management mechanisms that can minimize the need to devote scarce Commission resources for these allocations. One such mechanism is the use of the Commission's frequency advisory committees, which could he charged with assisting the FCC in the management of the PMRS spectrum.

97. Frequency advisory committees have a proven track record in promoting the efficient use of the spectrum. These committees have been extremely effective in the PMRS bands, both below and above 800 MHz, in preventing interference and in promoting efficient use of the spectrum. In fact, according to the FCC's 1994 Annual Report, coordinators are responsible for the successful deployment of almost 19 million PMRS land mobile transmitters.[41]

98. Frequency advisory committees can also assist the FCC in the fulfillment of its statutory obligation to avoid mutually exclusive applications. Section 309j(6)(E) of the Communications Act charges the FCC with:

> the obligation in the public interest to continue to use engineering solutions, negotiation, threshold qualifications, service regulations, and other means in order to avoid mutual exclusivity in application and licensing proceedings.

Frequency advisory committees can work with applicants to resolve mutually exclusive

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[41] 1994 Federal Communications Commission Annual Report, p. 121.

applications by recommending engineering and technical solutions. Coordinators can also encourage the parties to negotiate voluntary solutions that permit all parties to have access to the spectrum. Given the myriad of PMRS users that need access to spectrum, coordinators can ensure that this vital resource is used efficiently to benefit as many entities as possible.

99. It is particularly important to avoid mutual exclusivity in the new PMRS band(s) since the band(s) would include some services that are exempt from auctions.[42] The co-mingling of auctionable and non-auctionable services in a single band raises a particularly troublesome question regarding the resolution of mutually exclusive applications. The FCC is under statutory mandate to resolve all mutually exclusive applications through competitive bidding; however, it is not permitted to require certain services to compete at auction for licenses. To avoid this morass, the Commission should rely on the ability of its frequency advisory committees to coordinate such applications in such a way so as to avoid mutual exclusivity. Not only is this sound spectrum policy, but, as discussed *supra*, it would fulfill the Commission's statutory obligation under section 309(j)(6)(E) of the Act to avoid mutual exclusivity.

100. Finally, frequency advisory committees can assist the FCC in accelerating the licensing process, a goal that is paramount to the FCC and to the PMRS community. As noted throughout, there is a demonstrated and urgent need for new spectrum to meet PMRS needs. Frequency advisory committees can assist the FCC in speeding up the licensing process by

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[42] The 97 Budget Act exempted "public safety radio services" from auctions. Sec. 3002 (a)(2). The accompanying Congressional report explained that this term includes both traditional public safety entities and others, including utilities, pipelines, railroads, metropolitan transit authorities, PMRS ambulances and auto-emergency organizations, that are used to protect the safety of life, health and property." 143 Congressional Record H6172 (July 29, 1997).

ensuring that the necessary paperwork is properly prepared; all engineering and operational information is provided to avoid interference among licensees; and all FCC regulations are satisfied.

E. Promote PMRS Use of PMRS Bands

101. The LMCC urges the FCC to avoid licensing rules that limit the availability of spectrum for PMRS systems. Therefore, LMCC urges the FCC not to allocate the same bands of spectrum to both CMRS and PMRS systems. The co-existence of PMRS and CMRS systems in a single allocation will inevitably lead to one result -- the eventual elimination of PMRS users on those bands (*See* Sec. III, D, *supra*).

102. The FCC should also avoid unnecessary restrictions on PMRS users operating in the new PMRS bands. As PMRS services, licensees in these bands should not be subject to 911 obligations or universal service requirements, nor should they be subject to common carrier requirements under Title II.[43]

VII. Conclusion

103. The LMCC is aware that not all of the requests included in this petition are within the immediate authority of the FCC. For the FCC to be able to allocate spectrum that is currently reserved for Federal Government use for PMRS, that spectrum must first be designated for non-government use by either Congress or NTIA. However, the LMCC will be presenting the issues raised in this petition to both Congress and NTIA to expedite the transfer of this spectrum to the FCC. When such transfer is made, the FCC should be

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[43] Should eligibility for new allocations be modified to the "non-covered carrier characterization described in note 11, *supra,* this exemption would remain constant.

prepared to act in accordance with the recommendations in this petition. Further, the FCC should begin discussions with NTIA and appropriate Congressional offices to expedite the transfer of this spectrum.

104. In the meantime, the LMCC urges the FCC to consider the broader issues raised in this petition. Specifically, the FCC should immediately reconsider its recent policy determinations with regard to the needs of the PMRS community. Specifically, wide area geographic licensing and a system of competitive bidding should never be employed on spectrum allocated for PMRS use. The Commission should also recognize that the commingling of CMRS and PMRS systems in a single allocation can only have one result: the eventual dislocation of the incumbent PMRS licensees.

105. As has been amply demonstrated PMRS systems play a vital role in our nation's businesses and infrastructure. These internal systems contribute to the efficiency of the American economy; ensure the competitiveness of our businesses in the global marketplace; and are used on a daily basis to protect the safety of life, health and property.

106. Accordingly, the LMCC respectfully requests that the Commission fulfill its obligation to promote the public interest, convenience, and necessity, by promoting policies that will ensure the long-term survival and success of the PMRS industry.

Respectfully submitted,

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