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20 Alternatives for Improved Personal Communications

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James E. McNally, Jr.

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ALTERNATIVES FOR IMPROVED PERSONAL COMMUNICATIONS

by

James E. McNally, Jr. */

Office of Plans and Policy

September, 1986

*/ The opinions and conclusions expressed in this report are those of the author. They do not necessarily reflect the policies or views of the Federal Communications Commission or any other organization or individual. The author wishes to thank Michael G. Kemper of the Computer Applications Division for his "Old Density" program used to estimate the number of actual users on specific frequencies, and Thomas C. Spavins and Alex D. Felker of the Office of Plans and Policy, and Roger D. Madden, John B. Johnston and Stuart E. Overby of the Private Radio Bureau, for their many helpful comments and suggestions.



ABOUT THE AUTHOR

James E. McNally, Jr. has been employed with the FCC for seventeen years and currently is a senior electronics engineer with the Commission's Office of Plans and Policy. Previous FCC assignments include four years with the Field Operations Bureau (in which he was principally involved with a special Citizens Radio Service enforcement effort), seven years with the Private Radio Bureau (where he was involved with private land mobile and personal radio regulation), and four years with the Mass Media Bureau (in the Policy and Rules Division). Additionally, Mr. McNally has held a Technician Class Amateur Radio License (WB3APV) and a General Mobile Radio Service license (KAB-0689) since 1975, and formerly held a Citizens Radio Service License (KDN-6063).

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INTRODUCTION

The public interest in two-way radio telecommunications was demonstrated by the popularity of the Citizens Band Radio Service (CBRS), which in 1979 had 15 million licensees. However, the quality of service in the CBRS was poor, in part because of adverse long-distance propagation conditions and excessive congestion. Further, widespread use of the CBRS was alleged to have caused significant interference to television reception. Aware of these drawbacks, and desiring to give the public opportunity for access to a better quality radio service, the Commission, at a special meeting on October 12, 1978, decided to explore the feasibility of a new personal radio service in the 900 MHz band.

However, on November 5, 1984, the Commission concluded that other uses of the 900 MHz radio spectrum would better serve the public interest. On January 30, 1986, the Commission proposed replacing the General Mobile Radio Service (a personal radio service in the 460 MHz band that offers excellent quality communications, although at a substantially higher cost than the CBRS) with a new Consumer Radio Service (CRS) intended to offer low cost but very short-distance personal communications.

Resolving personal radio issues has been complicated by the competing demand for radio spectrum by the commercial segment of the communications industry, the absence of an effective public lobby, uncertainty as to the communications needs of the general public, and the absence of a method by which the value of radio communication to current and potential two-way radio user groups can be determined. If the Commission is to improve the availability of better quality two-way radio communications

among members of the general public, a different regulatory approach to the problem may be desirable. This study suggests regulatory changes intended to develop a more comprehensive and competitive land mobile communications marketplace.

A brief overview of the current personal radio services is provided and characteristics that may reduce their ability to contribute to the resolution of the personal radio problem are identified. Possible short-term regulatory changes are suggested, as are longer-term inquiries, some involving the non-personal land mobile radio services.

I. PERSONAL RADIO DEFINED AND DISCUSSED

This section discusses the concept of personal communications and personal radio services. The personal radio services that will be subsequently studied are briefly discussed. The difficulties in determining the value of personal radio services relative to commercial radio services are also noted.

This essay defines personal communications as those communications principally intended to enhance the activity of the individual. In order of probable importance, they include the following categories: emergency communications, expedient communications (i.e., communications intended to make the performance of activities more efficient), educational communications and recreational communications. A personal radio service is a radio service intended to provide for one or more of these categories of personal communications.

The semi-personal radio services

There are a number of radio services which are personal in nature that, while not the subject of this study, deserve brief mention.

The common carrier services are semi-personal in nature because, while they are used extensively for personal communications, services and rates are set on the basis of overall market conditions. A carrier's favorable response to the unique circumstances or unusual service requirements of an individual is unlikely. The individual has minimal impact on the day-to-day management of the service.

While IMTS and cellular common carrier services are widely used for personal communications (principally, for private telephone conversations between a person in a vehicle and a person at some point within the public switched telephone network), they are not discussed at any length in this study because their regulatory regime is distinctly different from traditional private services. This study is principally concerned with better provision of personal two-way radio (or land mobile) radio services that generally do not require access to the public switched telephone network or the sophistication that is characteristic of most common carrier systems. Thus, while the common carrier radio services principally fulfill an important demand for mobile telephone service, it is uncertain to what extent the current systems could be reconfigured to satisfy demand for other type of personal communications.

Other services are semi-personal due to regulatory necessity. The Aviation and Marine Radio Services may be used for some highly restricted, incidental personal communications. However, because activity in the air or on the water is potentially more hazardous than on land, frequencies must always be available for emergency communications. Indiscriminate personal communications are not possible due to the limited number of frequencies available and must be restricted in terms of availability and content if overall service discipline is to be maintained.

Thus, some services have a significant personal use element, but because of industry structure or potentially undesirable external effects requiring correction through regulation, can be characterized as

semi-personal in nature. As such, they will not be further discussed in this report.

This study considers whether there are other non-personal radio services (the Part 90 private land mobile radio services), which if freed from unnecessary regulatory constraints could more effectively participate in a competitive communications marketplace and contribute to the resolution of the personal radio problem. If these services are able to accommodate a personal use element, considerable progress can be made toward providing individual members of the general public with better opportunity of access to quality two-way radio service.

The personal radio debate

The debate on the personal radio problem began with the Commission's decision on October 12, 1978, that the Citizens Band Radio Service was inadequate to meet the personal communications needs of the public and that a better way of meeting these needs was required.¹ Subsequent Commission actions have considered whether public personal communications requirements should be satisfied through the creation of a new, comprehensive personal radio service. In view of the competition among established spectrum consumers for the limited amount of unallocated spectrum, the creation of a new personal radio service will be difficult. This study suggests that such an approach may be unnecessary, and if

¹ See the Report and Order in PR Docket No. 79-140 (Inquiry into the need for creation of a new personal radio service), 48 Fed. Reg. 12262, March 23, 1983.

attempted, may have a high probability of failure. Instead, it suggests that the personal radio problem may best be resolved by further deregulation of the existing land mobile radio services in an effort to create a more competitive land mobile communications marketplace that would include personal users.

The personal radio services

Currently there are three major personal radio services: the General Mobile Radio Service (GMRS), the Citizens Band Radio Service (CBRS), and the Amateur Radio Service (ARS).

These services are personal in the sense of being used principally for one or more of the four categories of personal communications (emergency, expedient, educational and recreational), and because the stations themselves are managed by individuals. Even in cases where the responsibility for station operation is shared (such as in the management of

"repeaters"²), the needs expressed by individual users are likely to be given consideration.

The General Mobile Radio Service, currently numbering some 14,500 users, is the smallest personal radio service. It is a private land mobile radio service intended primarily for short-distance two-way personal and business communications.³ It is principally used for expedient communications by personal and commercial users. While recreational communications by personal users are permitted, their percentage of overall traffic is small. The service offers eight paired 462/467 MHz channels. Mobile relay or repeater use is common. The quality of service in the GMRS is similar to that of the other shared commercial land mobile radio services. Thus, compared to the CBRS, it is quite excellent. Many GMRS personal users are former (sometimes current) CBRS users. However, since there are

2 The terms "mobile relay" and "repeater" are used synonymously in this report. They indicate a station that receives communications on an input frequency (usually the upper frequency of the frequency pair) and simultaneously retransmits them on the output (lower) frequency. Such stations are generally located on mountain tops, tall buildings or other similarly favorable places in order to maximize their service areas. "Control stations" (often inaccurately referred to as "base stations" by their users) are immobile stations located at the office or home. They may be in a generally unfavorable radio location, but as long as they can communicate with their associated repeater (which they must be able to do), then they are able to communicate with any other station (principally, mobile stations or units) within range of the repeater. Both control and mobile stations transmit on the repeater's input frequency and receive on its output frequency. Thus, they generally cannot communicate directly with each other (i.e., without the repeater), which is a disadvantage of this type of system. Often, mobile units are equipped to transmit on the repeater output frequency and can thus communicate directly with each other over short distances. Control stations cannot legally be so-equipped.

3 See 47 CFR 95.1

essentially no eligibility restrictions in GMRS, about half the licensees are commercial entities, many of whom have chosen the GMRS largely because of congestion in the other private land mobile services.⁴ Over the last decade, use of the GMRS by personal users has increased significantly. This shared use by personal and commercial users has resulted in some problems which will be discussed at length in the next section.

The Citizens Band Radio Service is similarly a private service intended for short-distance two-way personal and business communications.⁵ Over the years, use of the CBRS has become almost exclusively personal in nature. Generally, communications are of a recreational nature, although traveler's assistance communications are significant. Other types of expedient communications are less common. The CBRS offers forty channels in the 27 MHz band for voice communications in the "AM" or "double sideband" mode (which is similar to the emission used by AM broadcast stations). These channels may be split in order to yield 80 "single sideband" channels. This service was quite popular in the late 1970's-- there were nearly

4 See Graph 1, *infra*, where the number of GMRS licensees declined in the period 1970-1973. This unexpected behavior is explained by action taken in 1968 in Docket 13847 when the Commission "split" the then current 50 kHz bandwidth UHF channels into 25 kHz bandwidth channels, thereby doubling the number of available UHF channels in all of the private land mobile radio services. For several years thereafter, the GMRS was not needed as a service alternative and many of its licensees relocated to their more appropriate radio service. However, due to high growth in the use of two-way radio in the seventies, the GMRS again became utilized as an alternative in 1974. As will be explained in the next section, the perception that GMRS is a less congested radio service appears no longer warranted and may explain a recent decrease in GMRS growth.

5 See 47 CFR 95.401

15,000,000 licensees in October of 1979. However, the tremendous congestion, aggravated by extremely favorable long-distance propagation conditions (which are most unfavorable for local use), along with other less significant factors, rapidly led to disenchantment with this service. Even before the licensing of CB stations was discontinued in 1983, the number of users had declined considerably. On the basis of the trend existing at that time, the number of interference complaints received in the 1980-1985 timeframe, and the number of CB radios sold during 1985 (estimated at 2.25 million units), it may be reasonable to estimate that there are about 2.7 million households using CB radio to some degree today.

The Amateur Radio Service, currently numbering some 415,000 licensees, in both definition and fact is the most complex personal radio service. Concisely stated, it is a noncommercial service intended to provide emergency communications, ongoing amateur education, advancement in the communications art, an expanded technical pool, and enhanced international good will.⁶ Most amateur communications are recreational or educational in nature. It is arguable which is dominant since to a very large degree the recreation is education in the ARS. Many largely recreational conversations contain a technical element. Expedient and emergency communications account for only a small portion of the overall traffic. Considerable and diverse radio spectrum has been provided by the Government in the hope of stimulating engineering progress and developing technical skills. Incentive for advancement is provided through the

6 See 47 CFR 97.1

creation of various operator license classes which link operating privileges with technical knowledge and Morse Code operating skill. Limitations on the use of this service are few, and consist principally of some restrictions on the types of permissible communications that are intended to ensure the noncommercial, experimental nature of the service. Since large segments of the population are unlikely to be interested in radio as an object in and of itself, the Amateur Radio Service, while a legitimate personal radio service, will always have a somewhat limited appeal.

Difficulty in valuing personal communications in the absence of a marketplace mechanism

The determination of the value of personal communications (or a personal radio service) compared to commercial communications (or a commercial radio service) is not easy in the absence of a marketplace mechanism (i.e., a system that requires each user to pay some price for the privilege of communicating).⁷ Consider the following purely hypothetical example:

An employee is returning to the office after making a delivery. Personnel at the office become aware that goods ordered by the company have arrived at a location close to the employee and use two-way radio to request their pick-up. The value of this exchange of communications to the commercial entity is approximately the value of the time saved by the

⁷ See OPP Working Paper #2, Frequency Spectrum Deregulation Alternatives, by Douglas W. Webbink, October, 1980, p. 10.

employee expressed in the salary cost had the employee returned to the office, only to be sent out again on the new pick-up, versus the time required to divert to the pick-up point on the initial return trip (i.e., the value of the more efficient use of the employee's time), the savings in transportation costs, plus any benefits deriving from the earlier availability of the delivered goods.⁸

The actual dollar value of the communications exchange just cited may be difficult to determine (as would be the value of all radio communications by a licensee over a particular period). Nevertheless, the licensee should be able to attribute some value to the use of radio that would be offered if continued use of the radio was suddenly made contingent upon it.

Individuals likewise place some value on the use of their time, and in a given circumstance would be willing to pay for efficiencies made possible through the use of two-way radio. Thus, a motorist stranded on an

⁸ The Commission concluded, in the Report and Order in General Docket 83-26 (50 Fed. Reg. 865, para. 21), that efficiencies and cost savings such as those cited here translate into reduced cost of goods and services to the public, and thus, that the public interest would be disserved by any impediment (such as a new spectrum allocation for personal communications) to commercial access and use of radio spectrum. There is, however, nothing intrinsically superior about benefitting consumers indirectly through lower prices of market goods rather than directly through the availability of high quality personal communications.

interstate highway would certainly be willing to pay something to use a radio to call for a towtruck rather than to waste time walking miles to the nearest telephone. More commonly, it should certainly be worth something to a person to be advised by radio (on the way home from work) that certain groceries are needed, rather than to arrive at home, only to find out that that a subsequent (and possibly longer) trip is necessary.

Again, the dollar value of the personal communication just cited may be difficult to determine objectively. More important is the individual's recognition of its value and willingness to pay some type of compensation. The value of two-way radio is a judgment best made by the radio user, whether commercial or personal, who should at least have the opportunity of purchasing the desired communications capability.⁹

Ideally then, the Commission should continue to develop a framework within which commercial and personal radio users can express the

⁹ This is not intended to suggest that potential radio consumers have some right to have their communications requirements satisfied at unrealistically low prices. But if they are willing to pay fair market value for a particular communications capability, they should be accommodated. Also, while the example just cited deals with expedient communications, recreational communications will also have some value. What one person is willing to pay for expedient communications may be less than what another is willing to pay for recreational communications. Regardless, third-party judgments on the relative value of various types of communications may be unreliable and form a poor basis for deciding frequency allocations or deciding whether or not to create new radio services.

value they attribute to the use of spectrum.¹⁰ However, this has not been the case. In the absence of an effective land mobile spectrum marketplace, traditional regulation has favored the creation of various radio services with specific (and restrictive) eligibility requirements based on the idea that certain activities are more valuable than others, and that the FCC is the best judge of the value of those activities. Effective arguments can be made that this may not be the case.

Examples of regulation that probably may impair with the operation of a communications marketplace

Consider the Business and Special Industrial Radio Services. The Business Radio Service is available for the use of any commercial entity, educational, philanthropic or ecclesiastical institutions, clergymen, hospitals, clinics and medical associations. Operation in the Special Industrial Radio Service (which because of its eligibility restrictions has often been perceived as less congested and therefore more desirable) is

¹⁰ Any method that imposes an appropriate cost is likely to reflect the value the user attributes to the communications service. Typical examples are repeater use fees, SMR mobile unit charges and paging service fees. However, absent better opportunity of access to communications services (which generally is limited by eligibility requirements and certain operational restrictions in the various services), these types of user fees are likely to be artificially low. A currently unutilized method of determining service value would be to hold a spectrum auction that would require prospective users to pay some up-front access fee for the use of spectrum. This would require both commercial and personal users to be more aware of the value of radio to themselves and others. For a comprehensive discussion of the value of spectrum auctions, see OPP Working Paper #16, Using Auctions to Select FCC Licensees, May 1985, by Evan R. Kwerel and Alex D. Felker.

limited to, inter alia, farmers, livestock breeding services, construction companies (other than those involved in constructing buildings), and concrete and fuel delivery firms. Now while these are all worthwhile activities, it is certainly less evident that the dollar value of radio to a breeding company is comparable to its dollar value to a road construction company (indeed, the value perceived by the same types of users may differ, as well as the real value to society). Also, there are undoubtedly many commercial entities eligible only in the Business Radio Service that realize a value from the use of radio that equals or exceeds the value realized by the typical special industrial licensee. Thus, the Commission's decision to merge the two services as it proposed in 1957 in Docket 11991 may have been based on an incorrect determination of value.¹¹ A good case might be made that the two services should be integrated with assignment of the combined resources being made on the basis of the value licensees expect

¹¹ The Commission was persuaded that the Special Industrial Radio Service should be retained, that many of its operating restrictions should be eliminated, but that its eligibility restrictions should be revised to eliminate access by those not having long-range communications requirements and not having significant safety problems (see the Report and Order, Docket No. 11991 (23 Fed. Reg. 4790)). This action illustrates the Commission's policy of attributing particular communications requirements to certain types of commercial entities and satisfying those needs by the creation of particular radio services. Once the eligibility requirements for the services were determined, many equally valuable uses of the spectrum by similarly deserving but less known users were precluded. An alternative might have been to merge the Special Industrial and Business Radio Services for purposes of minimally restrictive eligibility, and reserve particular frequencies for long-range or safety communications and permit their use by any applicant able to demonstrate a satisfactory need.

to derive from it.

The same conclusion may be valid with respect to other commercial radio services. While the activities of all of those eligible to operate in the various Part 90 radio services conduce to the public welfare, the benefit derived from creating a multiplicity of radio services with unique frequency allocations is less evident. Also, even if the rationale for creating those services was valid at one time, it may not be today, since technology has provided more usable spectrum and minimized early differences in equipment performance in the various frequency bands. Thus, there is reason to believe that in the absence of a method whereby prospective radio users can demonstrate the value they place on radio (an effective communications marketplace) the Commission's traditional decision-making process (the notice and comment rule making proceeding) has served as a substitute of disputable success. Had such a marketplace been in place at an early date, there might have been much greater integration of the various land mobile radio services and additional opportunity of access for personal users.

Inadequacy of regulation as a substitute for a communications marketplace

The creation of the various radio services and eligibility restrictions is due to the fact that over time, certain then-ineligible but potential users of two-way radio successfully persuaded the Commission to allow them access to part of the spectrum. In the absence of an explicit spectrum market, this had to be done by convincing the Commission that their use of the spectrum was uniquely necessary for the good of society or more worthy than some competing alternative use. Political effectiveness became

important, with user groups being formed to assist in the lobbying effort. Since some kind of competition for use of the spectrum was necessary due to its limited availability, it occurred through the persuasive abilities of the lobbies and their legal representatives. The usual approach to obtaining spectrum generally avoided attempting to quantify benefits, and instead, emphasized various qualitative differences between the uses proposed by the contending parties. Inevitable distortions and inequities resulted.¹² This same condition exists today, although its effects are somewhat ameliorated by the Commission's ongoing deregulatory effort.¹³

The Commission's notice and comment rule making procedure poses particular problems for personal radio due to the absence of an effective public lobby.¹⁴ The few citizens groups that exist have rather specialized (and therefore small) constituencies and find it difficult to participate

12 For a more thorough discussion of this and similar weaknesses characteristic of the traditional (notice and comment rule making proceeding) federal regulatory process, see the introduction to The Regulation Game by Bruce M. Owen and Ronald Braeutigam, pp. 1-42, Ballinger Publishing Company, Cambridge, Massachusetts.

13 See, for example, the Report and Order in PR Docket No. 84-109 (Amendment of Part 90 of the Commission's Rules to eliminate permissible communications restrictions in the Private Land Mobile Radio Services), 50 Fed. Reg. 6179, February 14, 1985, which eliminated restrictions on permissible communications of licensees with exclusive-use frequency assignments, but not those of licensees operating on shared frequencies (concern had been expressed that unrestricted communications on shared frequencies would aggravate frequency congestion).

14 The argument may be made that the Commission should take the role of public advocate. However, the Commission is expected to be impartial and objective in its allocation of spectrum, so it is inappropriate that it should be biased in favor of any particular interest group, including personal radio users.

effectively in the rule making process. Comments of individuals may not be given much weight due to uncertainty as to how representative of the majority they are. In fact, anything other than a very general consensus of public opinion may be difficult to obtain. As a result, the Commission has relied heavily on the opinions of the communications equipment manufacturers for guidance on personal communications matters. Occasionally, these manufacturers lend some support to personal radio proposals.¹⁵ However, communications policy (personal or otherwise) ideally should not principally depend on the success of a lobby or the support of an equipment manufacturer; but rather, on providing opportunities for all potential spectrum consumers to satisfy their needs.

An intermediate objective, or means to this end, is the development of a flexible two-way radio communications marketplace in which all who have a need for two-way radio can participate. Such a marketplace would solve the problem of determining the value of personal communications relative to commercial communications by providing communications alternatives that impose an appropriate cost on the desired quality of communications for both personal and commercial radio users. In this way, the value of two-way radio services will be maximized.

¹⁵ General Electric initially petitioned the Commission to adopt its Personal Radio Communications Service (PRCS) proposal, but announced its withdrawal from that program just prior to the Commission's decision on the service. Other equipment manufacturers had questioned GE's ability to deliver PRCS radios at the low prices it had initially projected.

II. THE GENERAL MOBILE RADIO SERVICE

The General Mobile Radio Service (GMRS) is the direct descendant of the original Citizens Radio Service that was created on December 1st, 1947.¹⁶ Eligibility to operate is essentially unrestricted (foreign governments, their representatives and individuals under 18 years of age may not apply) and there are few restrictions on permissible communications.¹⁷ A station license is required, and the application form (FCC Form 574) is that used by the other commercial and public safety (Part 90) land mobile radio services.

Frequencies allocated to the GMRS

The GMRS is currently allocated 16 discrete UHF frequencies that are usually paired to make 8 actual channels that are authorized on a

¹⁶ Over the years, the current General Mobile Radio Service was known as the "Citizens Radio Service" (1947-1958), the "Class A Citizen's Radio Service" (1958-1978) and the General Mobile Radio Service (1978-present).

¹⁷ Permissible and non-permissible communications are summarized in Section 95.181 of the Commission's rules. The more significant non-permissible communications include those which would demonstrate an intent to cause interference or those that would be more in the nature of a broadcast or common carrier service.

non-exclusive use basis.¹⁸ These UHF (460 MHz band) frequencies are among the most desirable for land mobile operation and provide superior service, although at a new equipment cost five to eight times higher than the CBRS.

In the period 1957-1968, various rule makings (principally, Dockets 11991 and 13847) reallocated the Citizens Radio Service spectrum to the Public Safety, Industrial and Land Transportation Radio Services so that only 4% of the original 1947 allocation of 10 MHz (460-470 MHz) remains today. Subsequent spectrum reallocation proceedings (Dockets 18261 and 18262) allocated considerably more UHF (800 MHz) spectrum to land mobile services other than the GMRS, and the recent release of the "reserve" spectrum in Gen. Dockets No. 85-1231, 1233 and 1234 similarly made no provision for the GMRS.¹⁹

18 Frequencies (in MHz) allocated to the GMRS:

| Base/Mobile | Control/Mobile |
|-------------|----------------|
| 462.550 | 467.550 |
| 462.575 | 467.575 |
| 462.600 | 467.600 |
| 462.625 | 467.625 |
| 462.650 | 467.650 |
| 462.675 | 467.675 |
| 462.700 | 467.700 |
| 462.725 | 467.725 |

19 The GMRS, per se, was apparently not considered for an allocation, since it was never mentioned in the referenced proceedings. However, the question was raised as to whether it would be feasible to permit some of the reserve spectrum to be used for a new personal radio service outside of major metropolitan areas. Ultimately, however, this question was decided in the negative.

Mobile relay or "repeater" operation

More than 90% of GMRS stations ordinarily operate in what is called the mobile relay or repeater mode, where mobile stations and "control" stations (fixed stations at the licensee's home or place of business) communicate through a well-situated base station ("repeater") that receives communications on the upper frequency of the channel and simultaneously retransmits them on the lower frequency. The mobile relay station itself is rather expensive (\$1000.00 to \$5000.00 depending on age, quality and availability of supplemental features). Many (particularly those used by commercial licensees) are operated as "community repeaters" by an equipment supplier or service shop.²⁰ Personal use repeaters are often sponsored by a club or several individuals. Many GMRS repeaters are located at choice antenna sites where there may be a monthly fee for space and utilities. Thus, even if the system is operated as a non-profit, cost-sharing cooperative, service is often only available on a subscription basis.

GMRS service area and modes of operation

A typical mobile relay station (having an antenna height 150 to 300 feet above average terrain) will have a service area radius of 15 to 25 miles. Well sited repeaters (those with antenna heights in the vicinity of

²⁰ The term "community repeater" denotes a repeater used by more than one licensee. It may also connote use of different transmitter access tones by different licensees, so that they will not routinely hear each other's communications. Many personal systems use only one such access tone so that communications are readily heard by all. However, there is no requirement that this be the case. A single access tone could be used on a "community repeater" and multiple tones could be used on a personal repeater.

1200 feet above average terrain) may go as far as 50 miles. In some western states where extremely high (5000 feet above average terrain) mountain sites are available, the service radius may exceed 100 miles, at least in unobstructed directions.²¹ Mobile stations may communicate directly on either the base or mobile frequency when the comparatively wide service area of the repeater is not required. The base station frequency is generally preferred since it enables the user to observe any repeater activity. Also, since control stations may not directly communicate with mobile units on a mobile frequency, the base station frequency is the only permissible alternative. Such operation is generally termed "direct" or "repeater talk around", and is becoming increasingly popular as equipment cost declines. Control stations are often referred to by licensees as "base stations" because they comprise the principal operating point in the system as far as the user is concerned. However, they are really base station-like only in the sense that they do not move and usually have external antennas. They are treated more like mobile stations in terms of technical regulation and licensing policy.

GMRS growth

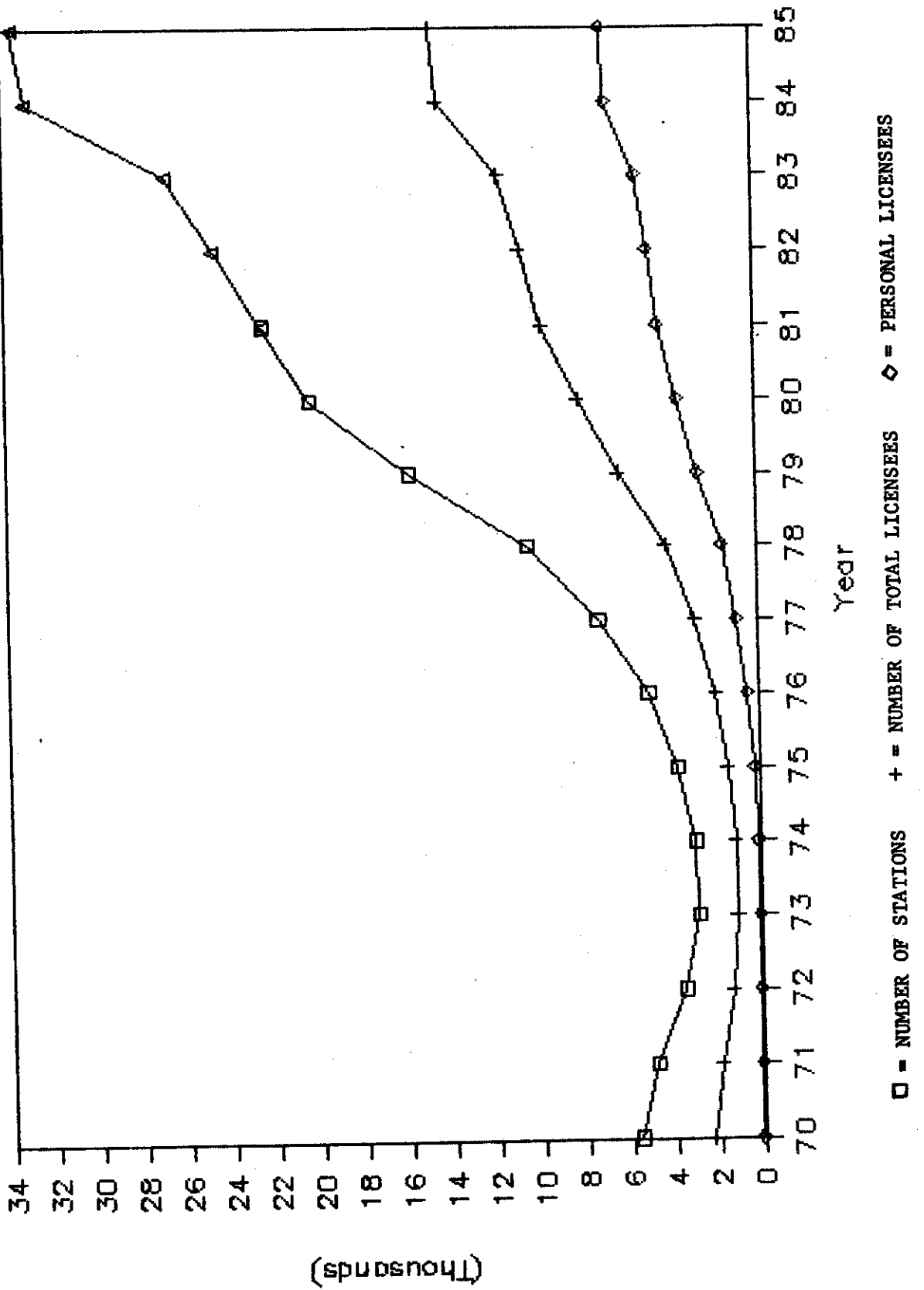
Prior to 1967, the number of GMRS stations was added to the number of Class B, C and D stations to form the total number of authorized citizens radio stations, so there is no way of knowing how many "Class A Citizens" (as it was known then) stations existed between 1947 and 1966 because the

²¹ At UHF frequencies, an improved service area is more easily obtained by increasing antenna height rather than transmitter output power.

source information has long since been discarded. Beginning in 1967, the FCC Annual Reports separate GMRS from the rest. The growth history is given in Table 1.22. The number of stations specified for the years 1981-1983 is less than might otherwise be determined. Prior to 1980, the FCC licensed individual classes of stations, giving each a separate call sign. Thus, a single licensee would normally be licensed for three stations- a control station (e.g., KAA-0123), a mobile relay station (e.g., KAA-0124) and a mobile station (e.g., KAA-0125). These three stations combined to make a communications system. To facilitate licensing and system identification, the Commission adopted an Order effective June 30th, 1980, that implemented a procedure of system licensing. System licensing permits most GMRS systems to be authorized on a single application form, under a single call sign. For the years 1980-1983, the Commission added the number of systems that were authorized to the previous total number of stations. In 1984, an adjustment was made to the figures to reflect the number of stations authorized per system, but the figures for the preceding three years were not individually corrected. Since (as stated above) most GMRS systems are mobile relay or "repeater" systems, the approximate number of individual GMRS licensees is one-third the number of authorized stations. Thus, on the basis of the number of stations authorized, we would expect that there are currently some 12,000 individuals or entities operating in the GMRS. In actuality, there are about 14,500 GMRS licensees, as determined from a count

22 Source data reflected in this and subsequent graphs was obtained from Private Radio Bureau (PRB) statistics, FCC Annual Reports and, in the case of personal user data, author estimates based on judgments of PRB licensing personnel.

GRAPH 1
 Estimated GMRS Statistics 1970-1985





of unique system call signs, as discussed below.

Congestion in the GMRS

The GMRS was compared to the Business Radio Service (a general use commercial radio service with operational characteristics similar to those of the GMRS, and whose principal lobbyist, the National Association of Business and Educational Radio (NABER) has been effective in securing additional spectrum for its use through the years) to roughly determine whether the GMRS (which has no comparable organization) might be expected to merit an additional frequency allocation. The comparison was made by making a computer search of GMRS and Business Radio Service (BRS) frequencies for the number of different call signs authorized per frequency on a nationwide basis. The base station side of the frequency pair is the best indicator of the number of licensees, since most licensees are expected to operate on that frequency, and since there is typically one station per system on that frequency. Nevertheless, in cases where multiple stations (e.g., a base and a mobile station in a single frequency simplex system) resulted in the same call sign being listed twice in the license record count, the repeated call sign was ignored. Thus, the tally should closely reflect the number of actual licensees or users per frequency, although the number of total service users will be somewhat uncertain, since some licensees are authorized to use more than one channel, and a small number of licensees may be authorized mobile-only operation on the mobile side of the frequency pair.

The small size of the GMRS made it possible to examine every available channel, so the number of call signs shown is very close to the

number of service users. Because of the large number of frequencies available in the BRS, the same procedure was not followed. Also, some frequencies in the BRS (e.g., central station protection service frequencies, "offset" frequencies and the like) have assignment or operating limitations that make them atypical. Accordingly, for the BRS sample, 8 "general use" channels were selected for analysis. As a matter of convenience, it was discovered that eight such channels existed exactly one MHz below the assignable GMRS frequencies. The survey results are given below ("ASMB" is the authorized number of mobile units on the indicated "base" frequency, "ASMM" is the number of authorized mobile units on the associated mobile frequency):

Nationwide Unique Call Signs Assigned per Frequency GMRS/BRS

| GMRS | | | | BRS | | | |
|-----------|------------|--------|--------|-----------|------------|-------|--------|
| Frequency | Call Signs | ASMB | ASMM | Frequency | Call Signs | ASMB | ASMM |
| 462.550 | 1628 | 18449 | 28187 | 461.550 | 1485 | 7463 | 17637 |
| 462.575 | 2033 | 18039 | 34712 | 461.575 | 1492 | 7054 | 16370 |
| 462.600 | 1883 | 14098 | 22897 | 461.600 | 1512 | 7107 | 16465 |
| 462.625 | 1454 | 12853 | 16793 | 461.625 | 1416 | 7308 | 16116 |
| 462.650 | 1351 | 24114 | 27297 | 461.650 | 1388 | 7005 | 15156 |
| 462.675 | 3057 | 26369 | 29320 | 461.675 | 1428 | 7251 | 15598 |
| 462.700 | 1624 | 11205 | 14519 | 461.700 | 1491 | 8487 | 17202 |
| 462.725 | 1459 | 15226 | 23754 | 461.725 | 1364 | 7106 | 15582 |
| Totals: | 14489 | 140353 | 197479 | Totals: | 11576 | 58781 | 130126 |

The anomalous number of users on GMRS frequency 462.675 is due to its popularity as a personal use channel. Most early personal use systems were established on this frequency and over the years personal users have put greater effort in securing this channel for their use. It is also widely used by REACT-type groups and is a de facto emergency use channel in GMRS.²³

The figures for the BRS suggest that equipment suppliers (who usually select frequencies for their clients), working with the frequency coordinator for that service (NABER), are evenly distributing licensees among the available channels. The average number of licensees per channel in the sample is 1447 and the maximum deviation from this is 83. In GMRS, which has no frequency coordinator, the average number of licensees per channel is higher at 1811, but the maximum deviation is 1246 if 462.675 is considered, and 460 if it is not. Based on these sample statistics, the GMRS appears to have some 25.2% more licensees per frequency than the BRS.

However, the number of users alone is an insufficient indicator of use. The number of mobile units per licensee also must be considered. The number of mobile units has traditionally (though sometimes

23 The acronym "REACT" stands for Radio Emergency Assistance Communications Team. Initially, these were groups of Citizen's Band licensees who regularly monitored CB Channel 9 for emergency and motorist assistance requests. Many of these groups now use the GMRS for intra-team communications and sponsor many of the personal use GMRS repeaters. Most of their operations are 462.675 MHz, so it has become the de facto GMRS emergency channel. CB Channel 9 continues to be monitored by these groups.

erroneously²⁴) been used as a gauge of frequency use, and in the absence of other data, it will be used here since there are similarities in the way users in each service operate.

From the data given above (using the "ASMM" mobile count), we see that the number of mobile units per licensee is 11.2 in the BRS and 13.6 in the GMRS. These "authorized" figures may be nearly double the actual number of mobile units in use, but there is no reason to assume that the overstatement on mobile units in the two services would differ. The ratio of authorized to actual usage would probably be the same. Also, the average personal user is unlikely to have more than five mobile units (two to three vehicular to correspond with the number of automobiles used by the family and one or two portables for peripatetic and public service use) so the information suggests that the GMRS commercial user is somewhat larger (in terms of authorized mobile units) than the average BRS user.

The ASMB mobile count difference between the two services is also interesting. As mentioned previously, mobile relay operation is the dominant mode of operation in the indicated frequencies (greater than 90% of all users). Thus, the number of mobile units authorized the use of the

²⁴ Mobile units would not be a valid indicator of use where there were significant operational differences between radio services. For example, interconnection (using the two-way radio to place telephone calls between mobile units and parties in the public switched telephone network) is permitted to a limited extent in the BRS (see Section 90.477) but not in the GMRS. If BRS licensees were making extensive use of interconnection, the average frequency utilization (in units of time) per mobile unit may be higher.

base station frequency suggests an intention to use the more spectrum efficient "repeater talk-around" mode of operation, where mobiles communicate directly with each other on the base station frequency without using the repeater. The data suggest that up to 45.2% of the BRS mobile units and 67.5% of the GMRS mobile units may be so-equipped.

If we let the density of use be the number of licensees per frequency times the number of mobile units, then we get a figure of 16206 (1447 x 11.2) for the BRS and 24630 (1811 x 13.6) for GMRS. Thus, if all other operational characteristics of the two services are considered equal, (which seems likely²⁵) the congestion in the GMRS may be 52% greater than the BRS. This is admittedly a rather simplistic comparison of the two services, and it is intended to be suggestive rather than definitive in nature. Nevertheless, absent the availability of information that would suggest otherwise, the difference in congestion in the two services appears to be significant. In conclusion, it appears that if the social cost of congestion in the two services is similar and an additional frequency allocation is considered necessary for the BRS, then a similarly appropriate allocation should also be considered for the GMRS.

25 The number and length of communications exchanges could be a differentiating factor. However, a reason for assuming a significant difference between the two services is not readily apparent. Even the fact that more lengthy interconnected communications are permitted in the BRS, but not the GMRS, may be counterbalanced by the somewhat more garrulous nature of GMRS personal communications. One-way paging is also permitted in both services on the general use frequencies. On balance, the two services appear quite similar, except for the personal use element in the GMRS.

Personal use of the GMRS

While individuals have always been eligible to operate in the GMRS, early users were commercial concerns that elected to operate in the GMRS to avoid the congestion the other services, to provide a single communications system for employees whose activities may have required the use of two or more of the other commercial radio services, or to have what was effectively an exclusive-use frequency. For many years (from its creation in the late forties until 1974), personal use of the GMRS was minimal. Even today, the GMRS is a radio service virtually unknown to the public.

In the early seventies though, the number of applicants applying as individuals (thereby assumed to operate more for personal than commercial purposes) began to increase. The majority of these personal users were (and are) individuals dissatisfied with the quality of service offered in the CBRS, and who wanted quality base-to-mobile communications in a disciplined operating environment. The GMRS was the only alternative available and the quality of service was considered worth the cost of equipment.²⁶ By the mid-seventies, personal use GMRS applicants (individuals) reached 50% of the annual total and has remained at that level ever since.

²⁶ The availability of used commercial radio equipment at affordable prices was also a significant factor stimulating personal use of the GMRS. Also, many early personal users were associated with Radio Emergency Assistance Communications Teams (REACT) that were seeking a more interference-free means of communications and had sponsored repeaters in the GMRS primarily for intra-team communications. Very few personal users own single user repeaters- they are simply too expensive. Nearly all personal use repeaters are operated by some type of collective.

The personal use versus commercial use question

The most significant problem in the GMRs concerns the perceived rights of personal users versus commercial users. As early personal use systems came on the air, a common reaction of earlier commercial users was one of incredulity. Personal users were told that they were using "commercial frequencies", that "CB type communications are not allowed" and that they (the personal users) "had better get off the channel." A typical personal user reply to these claims was that "anyone can be authorized to use frequencies in this (GMRs) service", that "personal communications are entirely legal", and that "business communications ought to be in the Business Radio Service." Insults were sometimes traded over the content of communications. In at least one case, a taxicab company was driven off its channel when a new personal use repeater suddenly enabled individual taxicabs to communicate with each other, causing a collapse in system discipline.²⁷ In another case, the same taxicab company paid a new personal use system to vacate their frequency.²⁸ However, operational conflicts

27 Conflict over the use of 462.675/467.675 MHz between Red Top Cab of Arlington, Va. and National Capitol REACT of Washington, D.C., 1976. Taxicab companies normally do not operate in the mobile relay mode. Usually, the dispatcher transmits on the base frequency and listens on the mobile frequency while the cabs transmit only on the mobile frequency and listen only on the base frequency. This enables the dispatcher to hear cab transmissions simultaneously while dispatching. The cabs cannot hear each other, only the dispatcher.

28 Conflict over the use of 462.600/467.600 MHz between Red Top Cab of Arlington, Va. and the Catoclin Communications Club of Frederick, Md., 1975. The latter was paid approximately \$500.00 to change frequency to 462.700/467.700 MHz.

were not limited to taxicab companies. It is alleged that some commercial users relocated to better antenna sites in order to "outcapture" the signals of personal use repeaters in selected areas; and that in some cases, established commercial systems were not fully loaded before new commercial repeaters were put on the air in an attempt to pre-empt further personal growth in the area.²⁹

This type of response to the sharing problem is unfortunate, and is inconsistent with Section 95.7(a) of the Commission's Rules which states that "channels or channel pairs assigned to GMRS systems are available only on a shared basis and will not be assigned for the exclusive use of any licensee" and that "all applicants and licensees shall cooperate in the selection and use of channels and channel pairs in order to reduce interference and to make the most effective use of the authorized facilities." This rule anticipates licensees monitoring the frequency for

²⁹ The Personal Radio Steering Committee (PRSG), an association of loosely affiliated personal users that publishes a national personal use repeater directory, a set of annotated rules and other information of interest to personal GMRS users, has petitioned the FCC (in RM-5058 and RM-5242) to limit the authorization of commercial entities in the GMRS in order to enhance the service's personal use utility. PRSG alleges that in many areas (principally, but not exclusively, urban areas) all available GMRS frequencies are very congested; that commercial users are frequently intolerant of personal use; that many commercial users are ill-advised to operate in the GMRS by equipment salesman who fail to mention the potential impact of personal communications; that the GMRS is often used by licensees in other services who want a second frequency in their original service, but cannot provide the required justification; that commercial users invariably operate in the mobile relay mode when direct mobile-to-mobile communication is possible; and, that commercial stations often fail to monitor the channel for ongoing communications before transmitting. PRSG mentions that high volume dispatch operations in GMRS are particularly troublesome.

ongoing communications and waiting for them to be completed, if necessary, before initiating new transmissions, not engaging in mutually antagonistic practices.

However, there are cases where repeaters are used for both commercial and personal communications. In many cases, separate personal and commercial systems coexist on a given channel with relatively few problems. This may be due to compatibility arising from the circumstance that many commercial users are active only during working hours, when personal communications are generally at a minimum. This leaves the channel free for personal use during the evenings and weekends. From the personal use perspective, compatibility may be optimum when commercial users do not transmit during the commuting hours, when personal use is likely to be most intensive.

The considerable increase in personal use of the GMRS over the last decade and the history of additional allocations to the Industrial Radio Services, often at the direct expense of the GMRS (see the discussion on Frequencies allocated to the GMRS, above) or personal radio generally (e.g., the decision in Docket No. 83-26 not to create a new personal radio service at 900 MHz), appears, on the basis of equity, to make a case for restricting commercial use of the GMRS.³⁰ If the Commission decided to

³⁰ Such a restriction would not be without precedent. Until 1958, eligibility in the GMRS was limited to those not eligible for an authorization in any of the other private land mobile radio services. See the references on GMRS eligibility requirements in the Appendix.

take no other regulatory action favorable to personal radio, such a restriction might be justified on the basis that since personal users have access to such a small amount of land mobile radio spectrum, they should not have to compete with commercial users for its use.

However, such an action would be inconsistent with the regulatory objective of promoting a more competitive communications marketplace through greater opportunity of access and greater operational flexibility. Essentially, the Commission would be asked to foster the personal use aspect of the GMRS by denying entry to commercial entities, some of whose use is likely to be highly compatible with personal use. Imposing such a restriction would be a typical example of Commission regulation in the absence of service value information that would be available from an effective communications marketplace. Excluding commercial users from the GMRS would be unnecessary if alternative means of satisfying demand for high quality two-way personal communications were found.³¹

License Application Procedures in the GMRS

A potential barrier to individual entry into the GMRS is the need to use FCC Form 574 in applying for a license. As mentioned previously, the Form 574 is the principal land mobile system application form used in

31 Meeting this demand should not necessarily entail restrictions on use of the GMRS, the creation of some new "wonder service", or any single "solution" to the personal radio problem. Rather, the solution should be sought along the lines of fine-tuning regulation of the existing two-way radio services to ensure that personal users have an opportunity of access comparable to that of commercial users.

the Part 90 radio services. It is a complicated form, requiring, inter alia, the applicant to determine the latitude and longitude of his mobile relay or base station, the height above sea level and the distance to the nearest airport. There is little likelihood of the novice applicant completing it successfully without help. Normally, Form 574 is completed by equipment suppliers as a service to their customers. Thus, its use is not generally burdensome to "the public." However, much of the personal use radio equipment is purchased second-hand from sources not providing application completion services. New users of existing personal use systems can model their applications on those that have already been successfully submitted to the FCC (i.e., those that have resulted in a grant), but the Form 574 can be daunting to those wishing to set up new systems who have no one to turn to.

One way many GMRS applications could be simplified is to eliminate the need for individuals to be specifically authorized the use of mobile relay stations; replacing this licensing requirement with a rule to the effect that "the licensee shall not communicate with a mobile relay ("repeater") station without prior consent or arrangement with the owners." This would eliminate the need for a lot of information on the Form 574 that pertains to the mobile relay station.

Consistent with the preceding recommendation, and to encourage more efficient spectrum utilization, GMRS licensees should be encouraged to transmit office or home-to-mobile communications directly (i.e., without going through a repeater), if possible. This would require the authorization of a combination base/control station, preferably under the

"20 foot rule" applicable to most control stations at this time.³² If the same proviso was made with respect to what might be termed a "small base/control station", most GMRS application forms could be considerably simplified with a concomitant decrease in application processing time. The resulting convenience would need to be weighed against the precision provided by knowing exact base station coordinates; but since the GMRS is not a frequency coordinated radio service, and because a grant would be made in any case, the lack of such information would appear to pose no significant problem.

Band authorizations in the GMRS

Another change consistent with the foregoing recommendation on application procedure would be to routinely authorize GMRS licensees to operate on any available frequency in the service, rather than a specific frequency or frequencies. Similarly, the Commission should reconsider whether or not it should be concerned about authorizing specific areas of

³² Under the "20 foot rule" applicants proposing to use control stations that will have antennas less than 20 feet above the supporting structure (other than a tower), currently need not provide the FCC with detailed geographic information about the control station.

operation.³³ Many times, GMRS licensees will be traveling through areas far from home. The ability to contact any nearby licensee for directions or roadside assistance could be very useful and clearly enhance operational flexibility. The chances of obtaining assistance would be increased if users were able to try to make a contact on all eight GMRS channels. This type of capability would not necessarily be inconsistent with the proposed requirement that users make prior arrangements for the use of mobile relay stations since most personal use systems are listed in PRPG's annual Personal Use Directory on the condition that their systems be available for use for short periods by travelers or others requiring emergency assistance. Thus, permission for such short-term use is effectively given in many cases.

Another reason for a band authorization is the de facto nature of 462.675 MHz as the GMRS emergency channel. While personal users operate on all available GMRS channels, the number on any particular channel may be quite small in a given area. Clearly, the chances of obtaining needed

33 These operational restrictions are typical of those adopted many years ago when, in the face of spectrum scarcity, the Commission required applicants to thoroughly justify their proposed use of a sought-after frequency. There was a disciplinary advantage associated with this policy; namely, that if licensees had the use of only a single frequency (or at least, very few frequencies), they would be forced to cooperate with their co-channel neighbors in an attempt to optimize its use. If many frequencies were available for use, it would be more difficult for a licensee to be aware of the operational patterns and needs of other users. This could result in inconsiderate users driving others off their particular channel, creating a de facto exclusive frequency assignment, to the detriment of those licensees who were willing to cooperate in the effective use of the available spectrum. It is difficult to say whether the value of any radio service is optimized by regulations of this kind. The benefits derived from potentially more disciplined use of the spectrum must be weighed against those lost by being unable to use the radio service to satisfy a greater variety of needs.

assistance would be improved by the ability to operate on any available frequency, but particularly 462.675 MHz.

Lastly, since the GMRS is not a frequency coordinated radio service,³⁴ the ability to operate on any channel, coupled with the availability of frequency synthesized radio equipment, could enable users to use the available spectrum more efficiently. Thus, if two potential communicators are close enough for direct (simplex) communications, and the frequency they normally occupy is in use by someone else, they could switch to a clear channel and promptly conclude their business. Thus, the ability to operate on any frequency in the GMRS would create a type of "manual trunking system" that would enhance the value of the service.

Similar efficiencies could result even when the use of a repeater is necessary. Multi-channel operation could encourage repeater operators to make interoperability agreements that could lead to more efficient use of the spectrum. For example, the small number of personal use repeaters makes it unlikely that two cochannel systems will be established in the same area. Since there are often significant differences in repeater service areas, restricting service users to one channel and one repeater system could result in inefficient use of the spectrum if the communications path

34 A frequency coordinated radio service is one that has one or more FCC recognized frequency coordinators. Such coordinators generally work with equipment manufacturer representatives to determine the most appropriate frequency for an individual applicant's use. In the GMRS, on the other hand, prospective users either rely on the advice of their equipment supplier or select their own frequency.

length is comparatively short and the repeater service area is great. A multi-channel operating capability could lead to greater use of local area systems for medium distance (5-20 miles) communications, with use of wide area (20 to 50 or more miles) systems only when really necessary.

Interconnection in the GMRS

Interconnection or "phone patching" is the use of a private land mobile station (such as a GMRS station) to place telephone calls in the public switched telephone network (PSTN). Interconnection in the GMRS was permitted on the same basis as other land mobile stations in the Part 90 radio services until 1978, when it was prohibited in response to problems in enforcing the then-current interconnection policy that required manually accomplished interconnection at shared facilities (principally, "repeaters").³⁵ While interconnection policies in the other land mobile radio services have subsequently become more permissive, action on requests for changes in the GMRS interconnection policy has been deferred pending resolution of the proceedings exploring the need for a new personal radio service. Since this question has been answered in the negative, there

³⁵ See the First Report and Order in Docket No. 20846 (Policies and Regulations to Govern Interconnection of Private Land Mobile Systems with the Public Switched Telephone Network) adopted on August 17, 1978. Early interconnection policy was restrictive for three reasons: dispute over whether shared use of private land mobile stations constituted common carrier operation; dispute over whether mobile telephone communications should be the exclusive domain of radio common carriers; and, concern about the effect of conversational communications (characteristic of telephone use) on the dispatch nature of communications in the private land mobile radio services. The first two issues were resolved in the final phases of Dockets 18921 and 20846, respectively. The latter has become largely moot due to deregulatory actions in the Part 90 services that have permitted increasingly liberal interconnection.

should be no reason to delay appropriate reform of the GMRS, including examination of the possible benefits of interconnection.

Interconnection capability would enhance operational flexibility and could be useful at times when no one is available at the base or control station, and there is need for a person in a mobile unit to obtain some type of assistance, or has urgent need of particular information. Even in personal systems where all users monitor the channel, situations may occur where there are no users that can make a local telephone call to obtain the service or information desired. In such cases, interconnection capability can greatly facilitate individual activity or the public welfare.

Technical flexibility in the GMRS

Because there have been no substantive rule makings relating to operation in the GMRS in recent years, it lags behind many of the other land mobile radio services in terms of technical flexibility.

Permitting the operation of low power (2 watts or less transmitter output power) systems on "offset frequencies" (frequencies offset by 12.5 kHz from the normally assigned channels) would add 7 new channels to the service that could be useful for a variety of short-distance communications functions.³⁶

³⁶ Such operation is currently permitted in the Business Radio Service and many other Industrial Radio Services. See 47 CFR 90.267.

Provision could also be made for the use of amplitude compandored sideband (ACSB) or any other narrow-band communications technology in the GMRS. Assuming 5 kHz of required bandwidth per frequency, this would increase the number of available channels to 40. Trunked use of some or all of those frequencies would result in even greater efficiencies.

Even better flexibility would result from permitting the use of any spectrum efficient technology in the GMRS, provided the radiated emissions are contained within the allocated GMRS spectrum, particularly if the operation of such a system would pose no compatibility problems with pre-existing systems. Such technical changes, if permitted consistent with the cost-effective availability of particular technologies, would permit the GMRS to be utilized to its fullest capacity.

While additional technical flexibility would benefit the GMRS as currently configured (i.e., as a typical land mobile radio service with frequencies available only on a shared-use basis), additional value might be derived by providing for the assignment of frequencies on an exclusive (or at least semi-exclusive) basis.

For example, it is more difficult for GMRS licensees as a collective body to decide to implement more spectrum efficient technology than for an individual licensee to do so. An individual GMRS licensee may decide that there are benefits to be obtained through the use of some narrow-band technology that will multiply the number of available channels. But if this benefit cannot be realized due to the reluctance of other cochannel licensees to participate in the more spectrum efficient

utilization process, or because the rules preclude the licensee's use of the additional channels so-created, then the value of service that would be provided by the new technology to that licensee (and indirectly, to society) is likely to be reduced. Thus, incentives may be required to encourage use of new technology in a shared frequency environment so as to maximize the value of radio service.

One such possible incentive would be to permit users currently sharing a single channel to divide it into exclusive-use channels if possible, with a guarantee that no new licensees will be authorized the use of the exclusive-use frequencies except pursuant to an agreement with the existing licensees. Thus, current service users would acquire a property right in their service that would enable them to subsequently manage their frequency in accordance with their own best interest.³⁷ The success of incentives for implementing the use of new technology will probably be related to the degree to which they vest current service users with a tangible say in the future of their radio service.

37 Such a plan would appear to require the implementation of some minimum cochannel and adjacent channel separation criteria in order to prevent the exclusive use channels from being further degraded by nearby authorizations involving the use of the older technology. Any short-spaced assignments existing at the time of conversion to the new technology would probably also need to be "grandfathered." See Implementing New Technology in the Land Mobile Radio Services, an Office of Plans and Policy staff report by Philip B. Gieseler (September, 1983) for additional discussion relating to the implementation of property rights in shared-use radio services.

Summary of alternatives for regulation of the GMRS

After many years of effective use as an auxiliary commercial service, the GMRS has experienced a significant increase in personal users, probably because it is the service of last resort to individuals desiring quality base-to-mobile communications and because equipment costs have fallen to the point of affordability by middle-class citizens. Furthermore, since the availability of the GMRS is unknown to most of the public, there is potential for considerably more personal growth. Even now, it appears that the GMRS may be experiencing congestion greater than that in the Business Radio Service and may deserve an additional spectrum allocation. Yet, whether or not such an allocation is made, action can be taken to extend and enhance the GMRS as the only quality personal radio service. The following recommendations should be given consideration:

1. Prohibit new commercial use of the GMRS and gradually phase out current commercial use in order to expand the availability of the GMRS for personal use, but only if other alternatives permitting an individual's opportunity of access to quality two-way radio service do not appear feasible.
2. Restructure GMRS application procedures to facilitate personal entry and more efficient use of the available spectrum by eliminating the collection of unnecessary information and by authorizing use of the entire GMRS frequency band.

3. Explore the feasibility of permitting some degree of interconnection in the GMRS, thereby permitting greater operational flexibility in the use of the service.

4. Update the GMRS technical rules to allow the use of state-of-the-art communications technologies.

III. THE CITIZENS BAND RADIO SERVICE

Creation of the CB Radio Service

The current Citizens Band Radio Service (CBRS) was created as the Class D Citizen's Radio Service in 1958 by a First Report and Order in FCC Docket No. 11994 that reallocated most of the 450 MHz band spectrum from the Class A Citizens Radio Service to other emerging commercial land mobile radio services (principally the Business Radio Service); and, as compensation to the general public, allocated 22 frequencies in the 27 MHz band for its use in the belief that the lower cost of equipment would be within the means of more citizens. This assessment proved accurate. Within a year the FCC was receiving about 7000 applications per month for stations in the new Class D service.

General description

The CBRS is a personal radio service used predominantly for recreation or to facilitate some personal activity. No station or operating license is required and the only eligibility restriction prohibits use of the service by foreign governments and their representatives, and federal government agencies. Users may operate on any of 40 channels starting at 26.965 MHz and ending at 27.405 MHz. The channels may be "split" for single sideband (SSB) use, but the dominant mode of operation is double sideband amplitude modulation. Transmitter output power is limited to 4 watts. Base-to-mobile range is typically 5 to 10 miles, and is principally limited by a high noise level consisting of a mix of many distant stations' signals commonly referred to as "skip." The frequent problem of unwanted distant signal reception is perhaps the greatest drawback to the service and is the

reason why the other land mobile services have migrated to higher frequencies as soon as technology permitted. Congestion is also a problem, although users engaged in casual conversation are generally willing to let a user with a more utilitarian need have immediate access to the channel. All operation is in the simplex mode, with each user alternately transmitting and receiving on the same frequency. Generally, the Citizens Band Radio Service "...is, in effect, a reservoir for all radio uses not provided for in other services." (1960 FCC Annual Report, p. 84).

Restrictions on permissible communications

Initially, many of the rules relating to operation in the Class D service were restrictive in the hope of fostering the discipline necessary if such a limited amount of spectrum was to be used on a wide basis. There were restrictions on permissible communications intended to ensure that all communications were expedient in nature. Communications of a "hobby" (conversational) nature were prohibited, as were those "technical" (amateur-like) in nature. An exchange of communications could not last more than 5 minutes; then the licensee would have to wait 5 minutes before transmitting again to ensure that all licensees had reasonable access to the available frequencies. Intrastation (base-to-mobile) communications could be conducted on any frequency, but interstation communications were permissible only on a few frequencies. Restrictive antenna height limitations were adopted to preclude the need for FAA tower coordination and to limit station service areas. "Skip working" (an almost continual temptation in view of the long-distance propagation characteristics of the 27 MHz band) was also prohibited. Many of the more conscientious licensees posted a copy of the "10 Commandments" of CB operation, based on the ten

most common rule violations ("Thou shalt not work skip.", etc.).

Increasing disciplinary problems

Growth in the Class D service was steady through the sixties, although as the number of licensees grew, disciplinary problems became increasingly evident. Many licensees concluded that CB had more use as a recreational radio service and began to ignore the operational restrictions cited above. The FCC replied to such activity by creating a special Citizens Band enforcement team in 1969 that was subsequently expanded to five teams in the early seventies. "Enforcement actions" were conducted in cities of a significant size on a monthly basis. However, the effect was generally short-lived, with the levels of violative activity resuming former levels six months to a year later. The enforcement effort was simply not able to cope with the large number of licensees.

Docket 20120 deregulation

In 1974, the FCC decided to accede to the popular will and legitimize the largely recreational character of the Class D service. In a comprehensive deregulatory rule making proceeding (FCC Docket 20120) conducted between 1974 and 1980, the FCC eliminated or mitigated many of the operational limitations. Hobby-type conversations were legitimized, the 5 minute waiting period between communications was reduced to one minute, and intrastation communications could take place on all frequencies. Additionally, spectrum between 27.235 and 27.410 MHz was allocated to the service, increasing the number of channels from 23 to 40. Channel 9 was reserved for emergency or travelers' assistance communications. The name of the service was changed from the "Class D Citizens Radio Service" to the

"Citizens Band Radio Service." These and other less significant changes were very effective in making CB truly a citizens radio service.

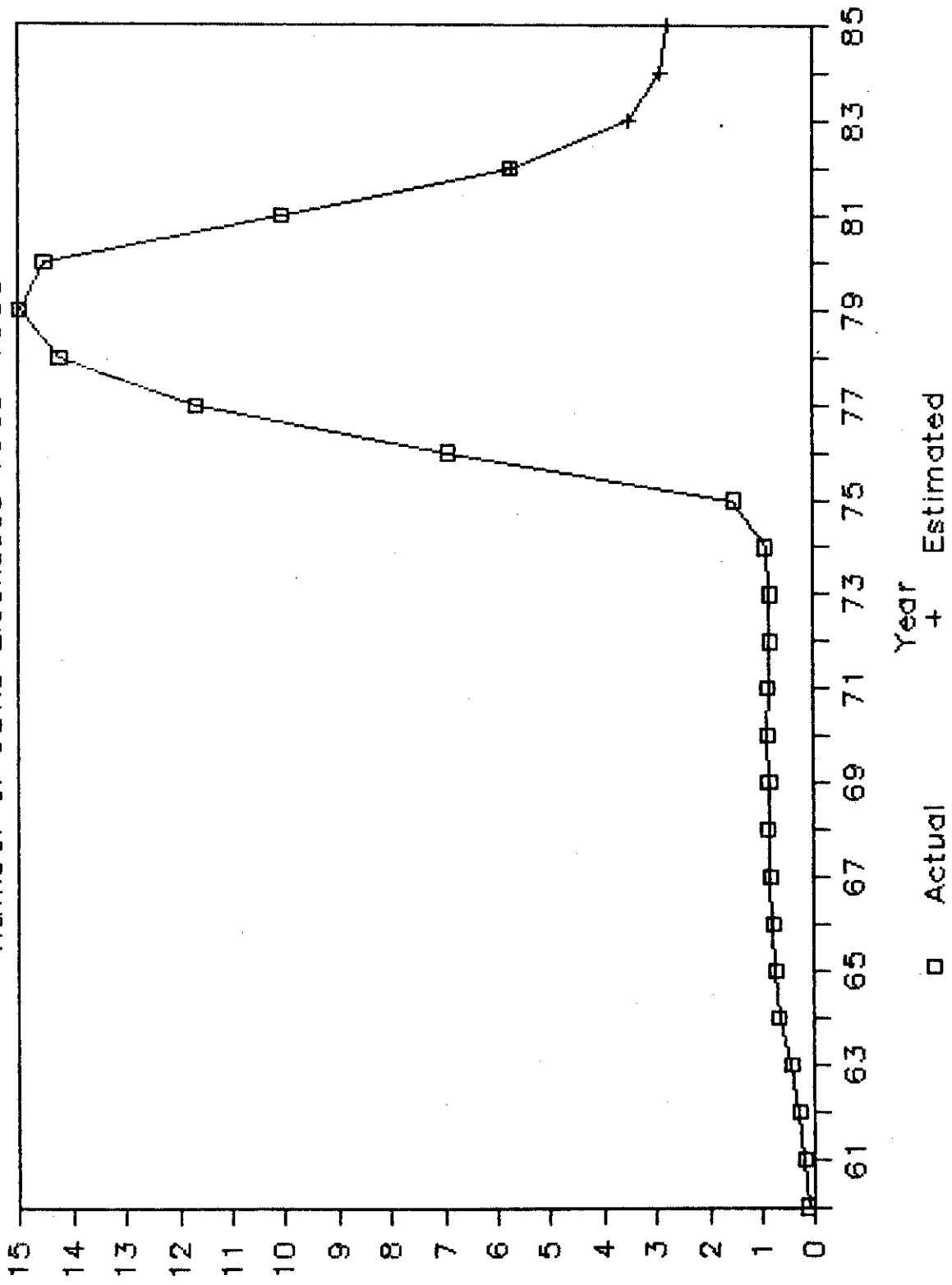
Growth

By late 1974, the number of licensees had passed the 1,000,000 mark and entered a period of exponential growth. This growth was no doubt due in part to the deregulatory action taken above; but in large measure was likely due to the arab oil embargo. Indeed, the public was quick to discover the value of CB radio in finding open gasoline stations during the 1973-74 gasoline shortage. CB was also (and still is) employed to monitor for reports of radar traps and police vehicles in an effort to circumvent the 55 MPH speed limit. Graph 2 shows the growth of the Class D service from 1960 to 1985.

As can be seen, the service experienced consistent growth through the sixties (by 1962 it was the FCC's largest radio service), leveling off in 1970 at about 850,000 licensees. The growth rate picked up dramatically in 1974 (probably for the reasons explained above) and exploded from 1975 to 1979 (extensive media coverage ensured that "CB radio" became a household word). However, it certainly appears that interest in CB was only a fad, since most of those licensees authorized between 1975 and 1977 failed to renew their licenses during the period 1980 to 1982. This sharp decline in initial interest, coupled with an almost complete lack of new interest, probably accounts for the apparent decrease in number of users in that time period.

GRAPH 2

Number of CBRS Licenses 1960-1985





Reasons for CB's initial popularity and subsequent decline

There are several speculative conclusions that may be drawn from the statistics. Since the availability of CB radio was well publicized by both television and movies, a number of users who may have otherwise been indifferent to the possibilities offered by two-way radio may have become licensees under pressure by friends "to be one of the crowd." CB radio, in many ways, was (and still is) a social activity. In a 1978 report,³⁸ the FCC's Personal Radio Planning Group (PRPG) discussed the results of a survey conducted by the Advanced Research Resources Organization (ARRO) that identified several significant needs underlying the demand for CB radio. They included the need for being entertained by listening to people talk, aiding others who need help, being able to get help in a highway emergency and getting directions while driving.³⁹ It noted that other needs "such as being able to talk to one's home from a car, and telephone interconnection capability were not as significant."⁴⁰ Thus, the PRPG report concluded that "Based on this information, it seems that most people currently need personal radio for highway use and a source of entertainment rather than as a sophisticated communications tool."⁴¹

38 Alternatives for Future Personal Radio Services, Personal Radio Planning Group, Office of Plans and Policy, May, 1978.

39 Ibid., p. 33.

40 Ibid.

41 Ibid.

The ARRO conclusions demonstrated the basis for the fad-like popularity of CB radio. The emphasis on CB as an entertainment medium, coupled with minimal interest in base-to-mobile communications, suggests that popular expectations were never very high, particularly with respect to the mobile characteristics of the service. The most popular form of communicating with CB radio is to engage in a "party-line" or "round table" type of conversation. This type of activity is useful in expanding an individual's circle of friends; however, because of the complete lack of security in CB communications, more private thoughts cannot really be expressed for fear of inviting dissenting opinions that may be inimical to the generally good comradeship that exists among CB operators. Once the number of friendships established through CB radio has reached a desired level, the quality of each friendship may require development on a more private level. Then, too, if CB is viewed more or less purely as entertainment, after a time new ideas encountered through it will become old, conversations will become increasingly routine, and the service generally more boring. This is particularly likely if there is a lack of new entrants into the service due to simple disinterest among much of the population.

Another factor which may account for the short-term interest in CB radio is station maintenance. While CB transceivers are quite reliable, CB radio mobile antennas are rather ungainly as antennas go and, like automotive receiving antennas, subject to vandalism. Proper repair or installation of a new antenna requires the use of technical equipment and tuning procedures that are really beyond the ability of the non-technically inclined lay person. Thus, if interest in CB radio has already declined

after some variable period of exposure, a broken antenna may provide the incentive to drop out altogether.

The foregoing is offered merely as a plausible explanation for the declining popularity of CB radio. Obviously, many other factors will be operative. While the ARRO study indicated general licensee satisfaction with the CBRS, the variable interference level contributes to the unreliability of service, as would congestion in more densely urbanized areas. In any event, the decline in number of licensees was dramatic, even before the FCC discontinued CB licensing.

Delicensing of CB radio

On April 27, 1983, in its Report and Order in Docket No. 82-799, the FCC decided to discontinue licensing of CB and radio control stations. This was done principally to ease the administrative burden on the FCC, although the Commission pointed out that the license had little intrinsic value since eligibility restrictions were minimal, and the license was available upon mere declaration. Accordingly, the requirement for station identification was deleted, although the rules "encourage" users to identify with any pre-assigned FCC call sign, operator initials followed by zip code, name, or where relevant, organizational description.⁴² The use of "handles" or pseudonyms was permitted in conjunction with any of the just-described means. This delicensing was opposed by the majority of those

42 See Section 95.417(b) of the Commission's rules.

filing comments and could only devalue the service in the eyes of its licensees.

Current number of CB users indirectly estimated

Since the FCC no longer issues CB licenses, it is difficult to estimate how many CB stations are currently in operation. However, using Commerce Department figures for the first 11 months of 1985, we estimate that the total number of CB radios imported that year was approximately 2,064,000. Of these, about 1,360,000 were mobile (DC only) units, 95,000 were combination types (CB/AM/FM radios) and 546,000 were hand-held units. Somewhat surprisingly, only 63,000 base station units (AC only or AC/DC units) were imported. (However, mobile units can easily function as base stations with an external power supply.) Assuming that the overall CB radio inventory is about constant because overall use of the service has stabilized, these import figures (few, if any CB radios are made in America) probably reflect actual consumption. No authoritative data is available on what percentage of this equipment was purchased for replacement purposes and what percentage was purchased by new entrants.

Nevertheless, the CB radios that were imported would satisfy the demand of some 1,000,000 new stations annually (assuming 2 radios per station), or about 5,000,000 existing stations, assuming no increase in the number of users and a radio lifetime expectancy of 5 years. More realistically, the CB "turnover rate" is probably about 20% per year, with little or no new growth. This assumption would yield a total of 2,777,000 stations (20% or 555,400 of which are new annually and would purchase 2 radios each for a total of 1,110,800 radios and 80% or 2,221,600 of which

are "old" users who would own 4.44 million radios and replace 20% of these or 888,000 radios/year).

The number of imported hand-held units cited above is interesting because its percentage of the total market (26.5%) is considerably higher than was observed in earlier years (less than 10% on the basis of field inspections). Traditional "walkie-talkies" are not particularly convenient to use in a vehicle, even if an external antenna is used.⁴³ This suggests that many users of the CBRS may be "passive" in the sense that they may not routinely use these radios, but carry them in vehicles in case there is need of communication.

Conclusion

The CB Radio Service has demonstrated the regulatory lesson that if a personal radio service attracts the interest of large numbers of the public, the service is likely to evolve in accordance with the popular will, notwithstanding initial regulatory intentions or ongoing dictates.

⁴³ Frequent flexing of the popular RG-58 antenna cable quickly results in a broken center-conductor, a chronic maintenance problem associated with such installations.

Therefore, any attempt to rigidly define the characteristics of a personal radio service is likely to be fruitless.⁴⁴

CB radio was initially intended as a short-distance 2-way radio service for utilitarian personal and family communications, but evolved instead into a principally recreational radio service with secondary but significant use as a travelers information and assistance service. The current equipment inventory pattern suggests that the latter use may be assuming increasing importance.

The ARRO survey, which was taken at the height of CB's popularity, indicates reasonably high user satisfaction with the service, notwithstanding adverse propagation characteristics and congestion. Subsequent disinterest in the service probably resulted from boredom with CB as an entertainment medium more than anything else.

Considering the early stage user satisfaction cited above, the currently available 40 channels are probably sufficient for the currently estimated 3,000,000 CB stations. (This admits that there may be congestion problems in selected areas.) Since the spectrum allocated to the CBRS is not great and is not in demand for other services, and since cases of CB

⁴⁴ This may also prove to be the case in the Commission's proposal in Docket 86-38 to create a new "Consumers Radio Service" based on equipment that would prevent undesired operation. If such a service is created with operational characteristics annoying to its users, a "state-of-the-art" CB-type rebellion could consist of replacing the integrated circuits comprising the "brain" of the equipment with those that do what the user wants.

interference to other services are declining (about 58,000 cases in 1980 compared to about 33,000 in 1985), there is no apparent reason why CB should not continue unchanged as a recreational/traveler's radio service.

IV. THE AMATEUR RADIO SERVICE

To reiterate the definition made in the first section, a personal radio service is one that is used for personal development or to facilitate the activities of an individual. The Amateur Radio Service (ARS), which was created principally as a means of personal development, is properly considered a personal radio service.

Initially, amateur radio was an informal association of inventors and experimenters interested in radio as an art in itself. Radio was first an experimental, then a developmental activity. The early experiments increased individual knowledge. Imagination quickly foresaw important uses for the new science. First, maritime radio evolved to enhance the safety of life at sea. Broadcasting and other uses of radio soon followed. In a real sense, amateur radio was the "mother" of the other radio services, nurturing them in the early decades with continual advances in communications technology.

Definition of the Amateur Radio Service

Section 97.3 of the FCC's Rules defines the Amateur Radio Service as a radiocommunication service of self-training, intercommunication and technical investigation. Section 97.1 states that its basis and purpose is to: Recognize and enhance the value of the amateur service to the public as a voluntary noncommercial communications service, particularly with respect to providing emergency communications; continue and extend the amateur's proven ability to contribute to the advancement of the radio art; encourage and improve the service through rules which provide for advancing skills in

both the communication and technical phases of the art; expand the existing reservoir of trained operators, technicians and electronics experts; and lastly, continue and extend the amateur's unique ability to enhance international good will.

Classes of operator license

Because the ARS is oriented toward personal development, incentives are provided to encourage continuing progress. They consist of six classes of operator/station license: Novice, Technician, General, Advanced and Amateur Extra. Operating privileges increase with the class of license.

Thus, the Novice Class licensee (who must pass a test demonstrating the ability to receive Morse Code at a rate of 5 words per minute, familiarity with the ARS rules and regulations, and practical elementary electronics), may use radiotelegraphy (international Morse Code) only on a few HF and VHF frequency bands. No radiotelephony (voice communication) is currently permitted.

Technician Class licensees must also be able to receive Morse Code at 5 words per minute. Additionally, they must pass a test on rules, regulations and electronic theory that is of nominal difficulty. The operating privileges are the same as the Novice Class, except that radiotelephony on frequencies in the VHF and higher bands (i.e., frequencies above 30 MHz) is permitted.

General Class licensees take the same written test as the Technician Class, but must pass a Morse Code proficiency test of 13 words per minute. Operating privileges are the same as the Technician Class, except that general access to the HF bands (1.8-30 MHz) is permitted.

Advanced Class licensees must be proficient in Morse Code at a rate of 13 words per minute and pass an intermediate level difficulty test in electronic theory. The operating privileges are the same as for the General Class, except that access to certain HF sub-bands is permitted.

The Amateur Extra Class licensee must be proficient in Morse Code at a rate of 20 words per minute and pass an electronics test of maximum difficulty. Full access to all ARS frequency bands is permitted.

Amateur licensee examinations consist of "elements" as described in the following table:

ELEMENT TABLE

- 1(A) General Code @ 5 WPM.
- 1(B) General Code @ 13 WPM.
- 1(C) Expert's Code test @ 20 WPM.
- 2 Basic law, rules and regulations essential to a beginner's operation, including sufficient elementary radio theory for the understanding of those rules.
- 3 General amateur practice and regulations, radio operation and apparatus, provisions of treaties, statutes and rules affecting amateur stations and operators.

4(A) Intermediate amateur practice and radio theory.

4(B) Advanced amateur practice and theory.

| AMATEUR CLASS | REQUIRED ELEMENTS |
|---------------|---------------------------|
| Novice | 1(A) and 2 |
| Technician | 1(A), 2 and 3 |
| General | 1(B), 2 and 3 |
| Advanced | 1(B), 2, 3 and 4(A) |
| Extra | 1(C), 2, 3, 4(A) and 4(B) |

The point should be emphasized that an amateur license consists of both an operator license and a station license. It is issued to an individual and that individual may not further delegate the operating authority to another person (except that one amateur may operate another's station, subject to the limitations of the operator's license). Thus, members of a family may not operate the amateur radio equipment of another member unless they are in his or her presence. For amateur radio to be of any use in facilitating family activities, several (if not all) of the family members would need to be licensees. Thus, while the ARS provides much in the way of communications capability, its use as a personal radio service will generally be very limited because only a relatively small percentage of the population would want to study the regulations and theory (and learn the Morse Code) necessary to meet the eligibility requirements (license class examination elements). However, currently there are about 415,000 amateur licensees. This number has remained relatively constant in recent years.

The most heavily used of the ARS spectrum are the HF bands between 1.8 and 30 MHz (for worldwide, long-distance communications) and the VHF (50-225 MHz) and lower UHF (420-450 MHz) bands. From the standpoint of providing for personal communications of a greater number of the general public, only the VHF and UHF spectrum would be generally desirable. The HF bands' natural use is for long-distance communications. While this capability may be of interest to a small number of the population that might desire to circumvent the need for making long-distance telephone calls, widely variable interference (due to changing propagation conditions), radio and television interference potential (comparable to that of the CB Radio Service) and limited amount of spectrum make the HF bands unsuited to any large increase in personal use.

Indeed, the VHF and UHF amateur bands are desirable for personal communications for two reasons: 1.) The frequency bands and communications systems widely used in those bands are similar to those used in other land mobile services; and, 2.) There are minimal entry barriers to the use of this spectrum. A person desiring to operate in the amateur 2 meter band (144-148 MHz) need only obtain a technician class license that requires 5 words-per-minute Morse Code proficiency and general knowledge amateur regulations and radio theory. The average person wanting to "cram" for the examination would probably be adequately prepared after a period of several days to two weeks, assuming several hours of study per day. While such study could be viewed as an inconvenience, it is certainly not a significant barrier to entry.

Nevertheless, the Commission should insure that the amateur examination elements are appropriate to the types of operation that would be performed by the licensee. There have been many complaints over the years that Morse Code proficiency requirements have constituted an unnecessary and artificial impediment to fuller use of the ARS. Many have questioned why a potential amateur with vast knowledge in the electronics field should be excluded from the service due to personal disinterest in the Morse Code. (There are currently no "codeless" classes of amateur license. The desirability of a "codeless" class of amateur license has been investigated in several rule makings,⁴⁵ and the prevailing amateur view has been that all amateurs should have at least some proficiency in Morse Code.)

Even if it is conceded that all amateur licenses should require some knowledge of Morse Code, the relevance of the currently required degrees of proficiency should be verified. For example, currently the only difference between attaining a General license and a Technician license is the required degree of Morse Code proficiency. The Technician class requires 5 WPM and the General 13 WPM. The 8 WPM difference may be a significant deterrent to attainment of the General class. The following table gives the approximate (rounded to the nearest thousand) number of licensees in the various classes:

⁴⁵ See the Report and Order in PR Docket No. 83-28, (49 Fed. Reg. 1097, January 9, 1984).

| <u>Class of license</u> | <u>Number of licensees</u> |
|-------------------------|----------------------------|
| Novice | 77,000 |
| Technician | 83,000 |
| General | 117,000 |
| Advanced | 98,000 |
| Extra | 38,000 |

The fact that some 83,000 Technician class licensees have not attained the General class license at this time suggests that the 8 WPM differential in Morse Code proficiency may not be trivial. Otherwise, even if many Technicians had little or no interest in non-Morse Code HF operation, they would have probably have sought the General class license even if only for the status that comes in having it. Therefore, the 13 WPM Morse Code requirement is a significant barrier to entry to the General class. How significant it is depends on the number of Technician class licensees who would like to operate in the HF bands but who have not done so either because philosophically they consider the Morse Code requirement irrelevant to good telephony (and other non-Morse Code) operating practice, or who because of some degree of neurological or physical impairment cannot (or can only with great difficulty) master the higher Code speed. An impartial observer of this situation might suggest that a Morse Code proficiency requirement be related to operation only in those frequency bands reserved for Morse Code operation.

Another possible explanation for questionable barriers to entry in the ARS is that those who have attained the higher license classes with some

level of difficulty would naturally object to rule changes that would have the effect of making access to their operating privileges easier. This attitude, while understandable, is nevertheless unreasonable and it acts to inhibit meaningful restructuring of the service consistent with current circumstances. Another obstacle to worthwhile reregulation may be based on the belief of current licensees that otherwise inappropriate barriers to access should be retained in order to inhibit frequency congestion.

Restrictions on "business" communications in the Amateur Radio Service

Limitations on so-called "business communications" in the ARS may also discourage its use for communications that facilitate personal activities, thereby further discouraging new entry.

For example, Section 97.110 of the amateur rules states that "The transmission of business communications by an amateur radio station is prohibited, except for emergency communications as defined in this part." Section 97.3(w) defines emergency communications as "Any amateur radiocommunication directly relating to the immediate safety of life of individuals or the immediate protection of property." Section 97.3(bb) defines business communications as "Any transmission or communication the purpose of which is to facilitate the regular business or commercial affairs of any party."

These rules have led to some confusion over what constitutes a "business communication" in the ARS. Some amateurs believe that to use amateur radio to call a towtruck for a stranded motorist is improper because amateur radio would be used to financially benefit the towtruck company.

Using amateur radio to place an order for a pizza to be picked up on the way home from work would similarly be improper. Another common belief is that it is permissible to advertise over the air that certain equipment is for sale, provided the price is not mentioned.

The 1983 Order that adopted Sections 97.3(bb) and 97.110 indicated that "Classic examples of business communications are those which deal with calling the office from an automobile by way of amateur radio in order to receive and leave business messages, or with providing a regular communications service to an employer, a local government or other entity."⁴⁶

However, on July 19, 1983, in a letter to Christopher Imlay, counsel to the American Radio Relay League (ARRL), the Chief of the Private Radio Bureau noted that he had received many inquiries since the issuance of the Order, indicating that it had not been as clear as it could have been. The letter emphasized that the Order "does not prohibit amateur radio operators from participating in the routine events of traditional public service activities" and that "amateur radio operators may provide communications for municipal parades, marathons, walkathons, Eye Bank activities and the like" and that while "(such activities) may incidentally benefit the sponsor, their main purpose is to provide a service to the public which is the real beneficiary." The letter goes on to include as being permissible "public service communications for neighborhood bike

⁴⁶ Order in the Matter of Business Communications in the Amateur Radio Service (48 Fed. Reg. 32999, July 20, 1983), para. 2.

aces, fireworks displays and the Olympic games." It concludes by saying that "we can all agree that a businessman, who also happens to be an amateur radio operator, should not use amateur radio facilities to call his office about details that surround his business transactions. On the other hand, the same businessman should feel free to use his amateur radio station if a member of the family becomes ill, if there is a safety factor in traveling on the highway, such as the need for a tow truck, etc."

Thus, while using amateur radio to call a towtruck appears permissible, no such "safety factor" would pertain to ordering a pizza, making a motel reservation while traveling, or many other utilitarian uses of amateur radio. Yet in none of these cases would the amateur directly intend that the communications benefit a commercial entity. Mentioning or discussing the price of a piece of equipment, while possibly conducing to the financial gain of an amateur (although incurring an actual loss may be just as likely), may also be warranted as an incidental activity conducive to the overall welfare of the service, in that it may facilitate the acquisition of desired equipment. Neither would such use of the ARS appear to significantly affect its experimental nature. Amateurs should not have to resort to questionable mental gymnastics in order to rationalize essentially innocuous communications. Of course, since the ARS is also an international service and subject to international regulations, there may be limits to the extent of its further deregulation in the area of permissible communications. Nevertheless, ongoing review of the rules and policies relating to permissible communications is necessary to ensure their clarity and applicability to current operating practice.

Amateur growth

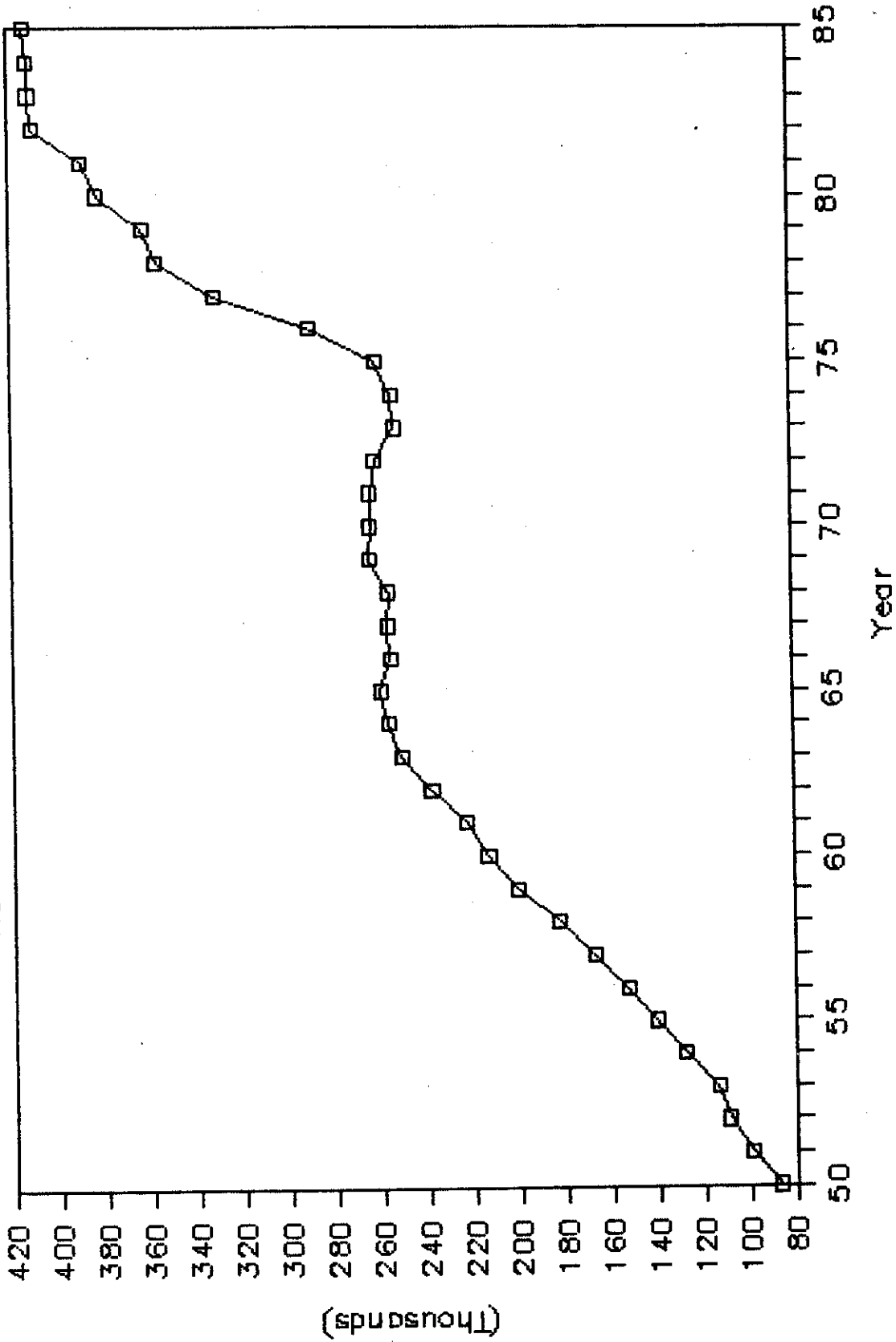
Graph 3 (on the next page) depicts the number of amateur licensees over a 35 year period beginning in 1950. It indicates that the ARS has gone through alternate high and low-growth periods of moderate duration, and suggests that absent any significant changes in the service, it may be a third to half-way into a low growth period. Since 1982, the number of licensees has increased only by about 1100 annually. The graph does not suggest a likely limit to the number of amateur operators. However, the high growth rate that took place between 1975 and 1981 coincides with the "boom years" of CB radio. Perhaps widespread familiarity with CB radio, followed by subsequent disenchantment and the search for a suitable alternative, served to stimulate interest in the ARS. If this is the case, then the growth between 1975 and 1981 may be anomalous. It is possible that absent the substantial but short-term interest in CB radio, the ARS might be in a 20 year period of stagnant growth. While some amateurs may view a minimal growth rate with satisfaction (since it tends to limit the amount of congestion), the potential effects of a relative decline in the number of amateurs relative to the overall population may be cause for concern over whether the public welfare is thereby being disserved, since amateur radio operators represent a significant public service and disaster relief communications capability.

Concluding remarks

Historically, the ARS has been a personal radio service principally through its use as a means of individual development of electronic and telecommunication skills. To encourage personal development, various classes of operator licenses are appropriate. However, not all

GRAPH 3

Number of ARS Licensees 1950-1985





communications in the ARS must pertain to personal development.

Recreational communications are permissible, as are many communications relating to matters of personal expediency and public welfare. The Commission's mandate to allocate frequencies in the public interest requires periodic re-examination of amateur radio regulations and policies to determine whether they continue to serve the public interest.

Certain aspects of ARS operation may require re-examination in order that it may be maximally useful as a personal radio service:

1. The examination elements for each license class should be reviewed to insure that required skills correlate with operating privileges. Any unnecessary requirements that may constitute a barrier to entry should be eliminated.⁴⁷
2. The rules relating to permissible communications, particularly so-called "business communications" (including personal communications of a financial nature) should be reviewed and clarified consistent with the goal of providing for maximum flexibility consistent with the nature and purpose of the service.

⁴⁷ A partial review consistent with this recommendation is underway in PR Docket No. 86-161 (Amendment of the Amateur Radio Service Rules to expand the Privileges Available to Novice Operators) 51 Fed. Reg. 17074, May 8, 1986, where examination of the operating privileges available to Novice Class operators is currently under review. This proceeding is summarized in the next section.

V. PENDING PERSONAL RADIO PROPOSALS

Currently, there are no rule making petitions in the CBRS that would significantly expand or enhance its use by the general public. With respect to the ARS, the Commission, on April 30, 1986, adopted a Notice of Proposed Rule Making in PR Docket No. 86-161, in response to 8 petitions, that proposes to expand the privileges available to Novice class amateur operators in order to stimulate new interest in the ARS.⁴⁸ Among the proposed privileges would be the ability to use voice emissions in certain frequency bands for the first time. The proposals are intended to reverse a trend that has seen the loss of 10,000 Novice Class amateurs (about 12% of that class) over the last two years. An important question raised in the Notice is whether this loss may not be a result of the limited privileges of the Novice class license, but may instead reflect an imbalance in the privileges and qualifications associated with the present license classes.⁴⁹ This proceeding affords an opportunity for public comment on the license qualifications and operating privileges of the entry level classes of amateur license.

48 See Footnote 47, supra.

49 Ibid., Footnote 4. Comment is requested on whether the Technician Class operator written test requirements could be confined to those topics from Element 3 commensurate with the VHF and UHF privileges authorized by that license. The Notice points out that it would be a simple matter to rearrange the topics into two syllabi: Element 3(A) for VHF and UHF and Element 3(B) for MF and HF. Element 3(A) would be a requirement for Technician and higher classes of license, and Element 3(B) would be a requirement for General and higher classes of licenses. An alternative not mentioned would be to retain Element 3 and afford Technician Class operators additional MF and HF privileges.

Of potential interest to members of the general public that may not be interested in the ARS are two petitions (RM-5058 and RM-5242) that seek to make the GMRS better able to satisfy potential public demand for quality two-way radio communications. Also of interest is PR Docket No. 86-38, that proposes to replace the GMRS with a new "Consumers Radio Service" that it believes may be more responsive to public needs. A brief summary of these proposals is given below.

RM-5058 (Restructuring the GMRS into a new "Personal Mobility Radio Service")

On June 11, 1985, in view of the Commission's decision not to go forward with the proposed Personal Radio Communications Service (PRCS) in Docket 83-26, the Personal Radio Steering Group (PRSG) filed a petition (RM-5058) to amend Part 95 of the Commission's rules governing the GMRS. Essentially, the PRSG sought the restructuring of the GMRS to enhance its personal use capability and enable it to meet significantly greater demand for higher quality personal communications, and its ultimate evolution into a new "Personal Mobility Radio Service" (PMRS). The name of the service, according to the PRSG, was chosen to more clearly illustrate its personal nature and reflect an emphasis on person-carried radios, rather than radios installed in vehicles. This is not to say that regular mobile operation would be "secondary" in any sense, but rather that as the public comes to perceive the utility of the new service, the continuous capability to communicate will be desired, giving rise to widespread and even dominant use of portable units.

GMRS restructuring evaluation criteria

The PRSG outlines nine criteria that it believes should guide the restructuring and evolution of the GMRS into the PMRS.

First, the service should be functional. It should be designed to serve the legitimate, non-frivolous, real-time communications need of the modern citizen in a mobile society. The PRSG notes that recreational uses of radio are already permitted in the CBRS and the ARS. Further, point-to-point communications (such as home-to-home communications) should be highly restricted, if permitted at all, due to the availability of other media (such as the telephone).

The new service should also be accessible; that is, access to the service should be easy and equitable. Licensing procedures should be simplified to the greatest extent possible. Membership in a special interest group should not be required, and use of a particular repeater should not depend on acquisition of equipment from a specific vendor.

The PRSG further believes that the service should feature operational simplicity. Sophisticated functions should be equipment controlled. A basic selective calling feature should be provided so as to eliminate the need to continuously monitor ongoing traffic for specific personal calls. The use of this feature should be routine, thereby discouraging conversational "round table" type communications.

Next, compatibility should be a feature of the new service. That is, a common type of emission should be used by all equipment, as well as a

common communications protocol. This is necessary because a personal radio service does not involve only intra-licensee communications characteristic of the Part 90 services, but various types of inter-licensee communications.

The PRGS also argues that the new service should be ubiquitous; that is, be usable without geographic constraint by the traveling public. The provision of traveler's assistance and emergency communications should be facilitated.

Accountability should also be required, since the sharing of limited spectrum can only be accomplished by mutual cooperation. To the extent possible, cooperation in use of the frequencies should be insured by a user transparent operating protocol. An automatic transmitter identification system (ATIS) should also be featured in the new service.

The new service should also be expandible- able to accommodate substantial growth. The PRSG notes that while the 400 kHz available to the GMRS (and the new PMRS) can obviously not be expected to accommodate the number of users envisioned in the PRCS proposal, it should be able to accommodate 500,000 to 2,000,000 users if spectrum-efficient transmission methods are implemented.

Lastly, the PRSG believes that the process of implementing the PMRS should offer continuity. Evolution of the GMRS into the PMRS should be structured to avoid, as much as possible, major dislocation or disruption of current personal use systems. Current GMRS users should not have to make unnecessary sacrifices in the transition to a more flexible radio service.

The implementation schedule should recognize that individuals do not have comparable economic opportunities (e.g., amortization of equipment for income tax deductions) that are available to commercial land mobile entities. To the extent possible, economic incentives to accelerate equipment conversion should be built into the rules.

Interim PMRS proposed

The PRSG believes that narrow band technologies, digitized speech, trunking and similar measures can yield a high capacity PMRS. However, it concedes that these technologies are not yet available and recommends that pending their development, an interim PMRS be implemented and used until about 1995. The interim PMRS would essentially be a restructured GMRS with continued use of the current narrow band FM technology. It would require the regulatory changes summarized below.

First, the PRSG recommends that eligibility to operate in the PMRS be restricted to individuals. The Commission is urged to preserve the GMRS/PMRS for those who are genuinely ineligible to operate elsewhere. The PRSG also recommends that personal use groups (such as REACT) not be licensed as groups, because individual users sometimes operate under the group call sign when transmitting purely personal communications, thus avoiding the accountability inherent in individual licensing. Most importantly, the PRSG urges an immediate moratorium on authorizations and modifications in the GMRS by those not currently licensed as individuals.

Second, the PRSG recommends amendment of current licensing procedure so that most users need only complete a simple application form

for a mobile license to operate in the GMRS. Operation from the home, with a "mobile unit" connected to a fixed, external antenna (for what would traditionally be "base" or "control" station operation) would be considered a logical extension of the basic mobile operating privilege. A "land station" license would be required only for base stations exceeding certain baseline technical parameters. Similarly, a "repeater license" would be granted to trustees of GMRS repeaters. Effective radiated power, in the case of the mobile license, would be limited to 5 watts,⁵⁰ and the associated fixed antenna must not exceed 20 feet above the height of the house or other supporting structure (other than an antenna tower or similarly specific antenna supporting structure). The use of directional antennas in the "control station mode" would also not be required, in order to facilitate direct home-to-mobile communications where possible. The frequency tolerance of these stations would be the same as a mobile station.

The PRSG proposes that repeaters be licensed only to a single "trustee" whom the Commission can hold responsible for its proper operation. Furthermore, repeaters should be required to operate on a non-profit basis. They could be owned by anyone (including a commercial entity), but the responsibility for operation would be vested in a specific individual. Repeater trustees should be given the authority to require users of their

50 The PRSG-proposed mobile power limit of 5 watts ERP represents a substantial reduction in the currently permitted transmitter output power of 50 watts (which with a 3 to 5 dB gain antenna would be 100 to 158 watts ERP). This reduction may be intended to place vehicular unit communications capability on a par with less powerful (2 to 5 watts ERP) portable units.

stations to participate in non-profit financial arrangements necessary for the support of the stations. However, potential users should not be discriminated against by virtue of source of equipment or non-membership in a particular club or association. Assignment of a particular operating channel would be necessary until trunking technology was available. Frequency coordination in the manner of the Part 90 services should not be necessary, but a repeater and control tone registration program of some type should be encouraged.

The PRSG also believes that users of the PMRS should be required to have the capability for direct communications; that is, the ability to transmit on the repeater output frequency in order to avoid using the repeater itself if possible. Two-frequency direct (duplex) operation would also be phased out as being overly spectrum consumptive. Furthermore, duplex base stations which cannot monitor the channel for ongoing traffic before transmitting can cause interference and should be required to monitor the output frequency. A similar situation occurs in the case of wireline control point operation of repeaters. The PRSG also recommends that mobile-only operation on 467 MHz frequencies be prohibited since such use cannot recognize interference to repeater operation. Thus, the general solution to these problems is to preclude all operation on 467 MHz frequencies except that related to repeater access and control.

The PRSG also proposes new narrow-band FM operation on GMRS offset frequencies 462.6125 and 462.6375 MHz. These would be available for general use, direct communications between all users but subject to very restricted output power. Other offset channels would be reserved for

narrow-band emission use. Two of these would be used for repeater control purposes. During this interim PMRS period, the PRSG proposes restricting users to not more than two channels, in addition to the offset frequencies mentioned above, in order to insure equitable treatment of all service users (they believe that in the past, some GMRS users have been given multiple frequency authorization without adequate justification). However, all PMRS service users would also be permitted to operate on 462.675 MHz, the current de facto emergency channel. The use of this channel for motorist assistance and emergency communications would thereby be enhanced.

Description of the finalized PMRS

The final-stage PMRS, proposed to be implemented in the late 1990's, would be patterned somewhat from the PRCS, using digital system control and selective calling techniques. Additionally, it could utilize digital modulation, such as linear predictive coding (LPC) with frequency shift keying (FSK) or minimum shift keying (MSK) to transmit voice quality information in a 5 kHz or less bandwidth channel, as technology permits.

In comments filed on its own petition, the PRSG proposed reconsideration of the weighting process currently applicable to operation in the GMRS that favors the use of repeater rather than direct communications. While repeater operation would be an important feature of the PMRS, the emphasis would be on accomplishing more spectrum efficient, short-distance communications. Thus, a channelization plan and operating protocol was proposed that would decrease the number of repeater channels available when loading of the direct communications frequencies increased beyond a certain point, making those channels available for direct

communications.

The PMRS would eventually offer 4 manually selectable "community channels". Each would offer single-frequency simplex type operation for group or community activities requiring communication among a number of users. Three channels would also be reserved for manually selected access to particular repeaters for wider area group communications. Provision for a greater number of community channels was seen as jeopardizing the nature of the PMRS, which, as indicated previously, is intended to be functional and utilitarian rather than conversational or recreational. The remaining channels would be used for digitally accomplished directed communications.

The foregoing summary touches only on the more prominent PMRS proposals. Numerous ancillary proposals and details have been omitted as unnecessary to understanding the overall thrust of the petition. Further information may be obtained by consulting either the RM-5058 or PR Docket No. 86-38 file.

RM-5242 (Short-term restructuring of the GMRS to enhance personal use)

On October 29, 1985, the PRSG submitted a supplemental petition on GMRS reregulation that was assigned petition number RM-5242. The PRSG urged that the Commission act on the submitted proposals (which were similar to the interim proposals made in RM-5058) promptly, whether or not it acted on the proposals outlined in RM-5058. Specifically, the PRSG proposed that:

1. The FCC permit only individual licensing in the GMRS;
2. Restrictions on cooperative repeater use by travelers should be relaxed;

3. The frequencies 462.6125 and 462.6375 should be made available to all GMRS licensees for low power, non-repeater communications;
4. Each operating point should be capable of transmitting and receiving on the 462 MHz frequency of the assigned channel pair(s); and,
5. A "trustee" should be responsible for each repeater, with general use base/fixed/mobile station authorization implemented in order to simplify GMRS licensing.

The rationale provided in support of these changes was similar to that described above relating to the interim PMRS proposals. This petition was dismissed April 16, 1986, by letter of the Chief, Private Radio Bureau, who indicated that it would be treated as a comment on petition RM-5058.

Consumer Radio Service proposed

On January 30, 1986, the FCC adopted a Notice of Inquiry concerning the creation of a new "Consumer Radio Service" (CRS).⁵¹ The new CRS would replace the GMRS and permit individuals to contact each other over short distances for the purpose of conducting a brief voice conversation. The belief is expressed that the new service will be useful to campers, hikers, cyclists, commuters, shoppers, travelers, public service organizations (such as REACT) and others, where "the need is for personal directed communications as the only possible means of contact between people."⁵² The Commission further states that "the use best suited to

⁵¹ See the Notice of Inquiry in the "Matter of Creation of a new Consumer Radio Service", PR Docket No. 86-38, (51 Fed. Reg. 5212, February 12, 1986).

⁵² Ibid. at paragraph 5.

personal communications needs is a critical component to design of a restructured GMRS" and that "most of the personal communications needs we have discussed (as mentioned above) would be most suitably addressed by a service providing two-way voice communications between persons with transceivers carried on the person."⁵³

The Commission is clearly mindful of its unsuccessful struggle with the public over the nature of the CBRS, for it next states that "rather than relying upon operator discipline and significant levels of Commission enforcement to prevent interference and achieve rule compliance, we could require equipment that would control users' actions automatically."⁵⁴

To further clarify its proposal, the Commission notes that "we envision units carried on the person for short-distance, low-power communications that would, if they were readily and inexpensively available, assist people in the conduct of everyday living."⁵⁵ The Commission indicates that while the new CRS is not intended to duplicate those services which provide for vehicular mobile radios, there would be nothing to prevent a person from carrying a CRS unit into a vehicle, and that such a unit would allow people to have flexibility in the use of the equipment.

53 Ibid., paragraph 6.

54 Ibid.

55 Ibid., paragraph 7.

VI. OTHER ALTERNATIVES FOR PERSONAL COMMUNICATIONS

Sections II through V of this study have concerned relatively minor proposals for restructuring the current personal radio services to better satisfy future demand for personal radio communications. However, the development of a viable personal communications marketplace is likely to require more extensive changes and, very likely, the involvement of other private land mobile radio services.

The following options go beyond the "fine tuning" of the current personal radio services suggested in earlier sections. While they may involve providing for greater operational and technical flexibility in the services indicated, their primary intent is the creation of a personal communications marketplace and, in a more general context, a general land mobile communications marketplace. They are not without drawbacks, however.

1. Permit personal use of SMRS systems

The Commission should consider allowing personal operation on 900 MHz SMRS systems.⁶² SMRS systems offer a communications quality similar to the GMRS at its best, although premium (expensive) communications equipment

62 A Special Mobile Radio System" (SMRS) is a private carrier managed communications system operating in the 800-900 MHz band. While there are some single-channel SMRS systems, most are trunked in 5 to 20 channel groups. Currently, eligibility is limited to those eligible in the Part 90 radio services (Public Safety, Industrial and Land Transportation Services). Individual use of such systems is not permitted.

The CRS is not envisioned as a cordless telephone service, and the possibility of interconnection, while not precluded, is discouraged.⁵⁹

Comments are then solicited on the most suitable operating protocol, the number of emergency or priority channels that should be provided, and means for insuring that non-emergency communications not take place on these channels.

The Commission notes that while individual GMRS stations are licensed, it does not intend to license CRS stations. However, it leaves open the option of licensing CRS repeater stations, or stations with higher than normal output power or antenna height.⁶⁰

The Notice then requests comment on whether commercial and personal uses have been compatible in the GMRS and whether they would be compatible under the proposed concept. Comment is also sought on the extent to which current GMRS operation should be grandfathered and whether suitable communications alternatives exist for those users.

58 Ibid., paragraph 14.

59 Ibid., paragraph 15.

60 Ibid., paragraph 20.

personal use than for commercial use.⁶⁴ This should not be cause for concern, because the current commercial users of such a repeater could first be given the opportunity to pay more to retain its use. Similarly, if cochannel licensees are bothered by the extra congestion that may develop as a result of personal use, there should be nothing to prevent them from approaching a repeater manager and offering some compensation if personal users are excluded. The goal is for all communications system users to pay an appropriate price for the quality of service they desire. This result cannot be achieved if personal users are arbitrarily excluded from access to most of the private land mobile spectrum. Even if personal user demand for access to commercial repeaters is small (which is likely to be the case), a system will be in place whereby commercial users (through their repeater managers) can trade in interference rights and pay a price that will result in the quality of communications they desire.

64 A conservative approach to permitting personal use of commercial spectrum might be based on the belief that while personal users ought to have access to commercial spectrum, they need not have unrestricted access. Thus, (under this conservative approach) it would be inappropriate (for example) to grant a license to operate a repeater in the Business Radio Service to an individual applicant. Also, a prospective repeater operator should be fundamentally eligible to operate a station in a particular commercial radio service in order to have the incentive to make a prudent judgement as to the compatibility of personal use in a given area. (In a sense, personal users could be eligible on a secondary basis- contingent on being "sponsored" by a commercial user.) This would have the advantage of tending to preserve the "business" identity of the Business Radio Service. A more progressive and flexible approach would be to allow a commercial licensee to sell the authorization (i.e., assign all rights contained therein) to a personal user for a suitable price, or to initially permit individuals to sponsor commercial repeaters as an investment opportunity (i.e., selling communications service would in effect become the "business" of the individual).

declining cost of portable equipment.⁶¹ Demand for the CRS is equally uncertain. Thus, any restructuring of the GMRS should provide for the evolution of a communications marketplace that will enable the GMRS (whatever its future name might be) to better reflect the desired cost and quality of two-way personal communications.

⁶¹ A new, low-end (two watt, one to four channel) 460 MHz portable radio ("walkie-talkie") can be obtained for less than \$400. Similar mobile units cost \$50. to \$100. more, probably because their output power is somewhat higher (six to fifteen watts).

a combined amateur/personal radio service operating in this spectrum. Such a service might generate additional interest in the ARS.

4. Restructure the Amateur Radio Service for more accessible personal operation

The 144-148 and 420-450 MHz amateur bands feature widespread direct and repeater communications of a conversational nature. The Commission may wish to inquire into the feasibility of permitting extensive personal communications in all or part of these bands, with members of the household of a licensed amateur operator being permitted to operate that amateur's equipment for home-to-mobile (or portable) communications, even if the licensed operator is not present or not a party to the conversation. All such communications would be identified by the call sign of the authorized amateur operator, who would have ultimate responsibility for proper use of the station. Interstation communications by such unlicensed operators need not be permitted, though there may be cases (particularly in emergencies) where they may be desirable. The operating discipline that is characteristic of the ARS may be sufficient to minimize abusive operation.

The cost associated with this approach is a potential shift away from the experimental/instructional communications of the ARS to more expedient communications, or purely recreational communications. Nevertheless, such a change in the fundamental nature of the ARS would still be in the hands of the amateurs who, in charge of this communications activity by members of their households, would be able to initiate appropriate action needed to maximize the overall value of their service (e.g., such type of operation might be confined to less desirable frequency

is required.⁶³ Personal demand for that degree of quality is likely to be rather small, the price being a significant barrier to entry. But if personal users are willing to pay the price, SMRS operation should easily be able to satisfy their needs. As noted previously, there is often some compatibility between personal and commercial use, and this could be established by the SMRS operator.

2. Permit personal use of commercial systems on non-exclusive frequencies

Another alternative would be to consider allowing personal operation on any commercial repeater system, if the permission of the existing users or repeater manager is obtained. Commercial repeaters, even if operated on shared channels, are generally managed by equipment suppliers or service shops, not a collective of individual licensees. The particular repeater manager should be able to operate in a manner similar to an SMR operator, making a case-by-case decision as to the compatibility of personal use of the commercial system.

Occasionally, the situation may occur that the repeater manager will conclude that more money may be made from leasing a repeater for

⁶³ New GMRS two-way mobile radios are typically available for \$500-\$900. New 800 MHz trunked SMR two-way mobile radios cost between \$900 and \$1500.

Conclusion

The preceding recommendations vary from the traditional (e.g., frequency reallocation) to the innovative (e.g., those that would further develop a land mobile communications marketplace). Together with the suggestions offered in previous sections, they offer a variety of regulatory approaches that may be taken to satisfy the demand for quality personal communications. However, the better recommendations pertain to the development of a more effective land mobile communications marketplace that, in turn, will better relate the cost and value of communications services. Such a marketplace exists, but at a less than optimum level of effectiveness due to systematic exclusion of potential communications consumers and the continuation of service categories and eligibility restrictions that in many cases have probably become outdated. The need to resolve the personal radio problem affords an opportunity for a more comprehensive re-evaluation of all of the private land mobile radio services to ensure that their value to society is being maximized.

A potential impediment to personal use of shared commercial frequencies is that since they are not authorized on some sort of property or resource-right basis, there is nothing to discourage an opportunistic new entrant from constructing a new system in a long-established, stable environment for the sole purpose of being bought out in some way by current users who wish to retain the status quo. Thus, some reasonable way of precluding such entrants would have to be provided- perhaps by the application of area-specific channel utilization criteria that could be applied by a frequency coordinator to assess the impact of the new system on current users.⁶⁵ The difficulty in defining the resources of current users may be considerable and additional study is necessary to determine whether such an effort to foster a communications marketplace on non-exclusive use frequencies would be worthwhile.

3. Allocate spectrum in the 900 MHz ISM band or the 1.215-1.300 GHz band for personal use

Currently, the Amateur Radio Service is authorized the use of 26 MHz of spectrum in the 902-928 MHz band and 85 MHz in the 1215-1300 MHz band. While the latter band is high in relative frequency, all of this spectrum is still in the UHF range, and relatively affordable equipment is available for direct and repeater-type operation. The Commission may want to consider allocating part of this spectrum for personal use, or create

⁶⁵ Such a determination by a frequency coordinator might be appropriate in view of the additional spectrum management responsibilities delegated in the recent Report and Order in PR Docket No. 83-737 (adopted April 3, 1986).

A P P E N D I X

REFERENCE MATERIAL ARRANGED BY SUBJECT

Creation of various Industrial Radio Services

Report and Order in Docket 9018 (13 FCC 1224) creating inter alia, the Special Industrial Radio Service in 1949.

The Commission indicated that it based its decisions on the need for creation of the various land mobile radio services and their various classes of eligibles on the following criteria: 1.) Did the service really require the use of radio? 2.) Services necessary for the safety of life or property deserved more consideration than those more in the nature of a convenience or luxury. 3.) Which service would benefit the greater number of people? 4.) Where in the spectrum should the service be located? 5.) In the event of competing claims to the same spectrum, the Commission would consider the number of transmitters and receivers already in use, the investment of the industry and the public in equipment, and the cost and feasibility of converting to different frequencies. 6.) The effect on achieving international standardization of maritime mobile service allocations.

Notice of Proposed Rule Making in Docket No. 11991 (22 Fed. Reg. 2593, April 16, 1957) that, inter alia, proposed terminating the Special Industrial Radio Service (SIRS) by including its users in a new Business Radio Service having considerably expanded eligibility requirements.

Report and Order in Docket 11991, Industrial Radio Services—Changes in availability of frequencies, (23 Fed. Reg. 4790, June 28, 1958).

The Special Industrial Radio Service Association (SIRSA) and others successfully argued that the SIRS should be retained, that eligibility for use of the service should be revised with a view to eliminating access to the service by many persons not having long-range communications requirements or significant safety problems, and that the frequencies allocated to the service be increased (para. 41). The Commission agreed, stating that (it) "had studied the above comments in the particular light of the indisputable need of business generally for mobile radio facilities, of present usage and requirements within the Special Industrial Radio Service, and of the administrative difficulties it has experienced with respect to the latter service and has concluded that, at least temporarily, the above consensus should prevail" (para. 42).

GMRS Eligibility Requirements

Order, "Licensing and administrative aspects of the Citizens Radio Service", Docket No. 9119 (14 Fed. Reg. 1596, April 5, 1949).

1954 FCC Annual Report, pp. 81-82.

bands), or cause such operation to be discontinued if significant problems developed.

5. Allocate 460 MHz spectrum from the Industrial Radio Services to the GMRS

This option assumes that personal user opportunity of access to spectrum remains essentially unimproved, that the GMRS is retained essentially as is, that a spectrum-efficient technology has been implemented and that demand exceeds expectation. The reallocation of several channels from the Business Radio Service or one of the other Industrial or Land Transportation Radio Services may be justified. A 450 MHz band allocation to the GMRS would avoid the need for a multi-band operating capability. The GMRS contributed frequencies to these services in its infancy and they have had the benefit of substantial 900 MHz allocations over the years. The number of commercial users who would need to vacate their channels would be on the order of several thousand (assuming an average of 1500 users per channel). The loss of (for example) four channels in the Business Radio Service would only amount to several percent of its total allocation, but it would represent a 50% increase in the GMRS allocation. Such a reallocation might be appropriate if the GMRS continues in its tradition of being a disciplined radio service, if spectrum-efficient technology is widely used, and if such technology is not in use in the Business Radio Service. Clearly a considerable disparity in perceived spectrum utilization between the two services would be necessary to overcome the expected political opposition.

used to implement this objective. Thus, the service would be as self-regulating as possible.

Docket 83-26 Report and Order

The Commission stated that "After weighing a number of factors, we have concluded that traditional private land mobile and cellular systems, as well as a mobile satellite service, must take priority over a personal radio service." However, the Commission did indicate that it was soliciting comments in two other proceedings (General Dockets 84-1231 and 84-1233) concerning the feasibility of sharing land mobile and cellular allocations with a personal radio service in areas outside major population centers; but pointed out that such geographic constraints would make the service unavailable to one-third of the population, potentially threatening its economic viability, and requested comment on whether personal operation in urbanized areas could be effectively precluded. Ultimately, these proposals were not adopted.

PR Docket No. 86-38 Notice of Inquiry

Inquiry into the desirability of transforming the GMRS into a new "Consumers Radio Service."

Less significant actions (1980-1985):

During the pendency of the Docket 79-140 and 83-26 proceedings, the Private Radio Bureau declined to act on any petitions that would significantly alter the status quo in the GMRS. Various petitions relating to the GMRS were therefore dismissed. However, several rule making actions of a relatively non-controversial nature were completed.

Order implementing system licensing in the GMRS (June, 1980).

The principal benefit of this action was ease in station identification since one call sign, rather than three, was assigned to each system. Also, the license application procedure was rendered somewhat easier through the use of one application form, rather than the three required previously.

Order dismissing petition RM-3830 (request to provide for radio linking of remote GMRS repeater receivers on GMRS offset frequencies) on the basis of uncertain interference potential to regular GMRS operations (1981).

Order denying petition RM-2425 (a proposal to add/delete repeater users by license attachment and to amend the signal strength standard for control stations), March, 1982.

In response to the first concern the Commission proposed the use of a temporary operating permit that enabled new users of established repeater systems to operate pending receipt of a regular license by identifying with the letters "WT" followed by their telephone number. The signal strength proposal, which requested that the long-standing policy requiring control station signal strength to be not more than 6 dB greater than the signal strength of a mobile unit at the same location be replaced

report on the state of personal radio.

Volume 1 dealt with the state of user rule compliance in the CBRS and recommended the implementation of ATIS and much more rigorous enforcement of the rules in order to discourage recreational communications and make the CBRS more utilitarian.

Volume 2 principally addressed ancillary facets of personal communications such as the need for better operator training, disseminating information, interference, electromagnetic compatibility, technical standards and public safety uses of personal radio. However, a section also addressed future personal use radio communications needs, recommending that the Commission implement a viable VHF-FM "Personal Mobile Radio Service" that would be relatively noise-free and have the capability for direct-dial, automatic trunking and selective calling, as well as other features that might enhance rule compliance (such as ATIS, busy channel lock-out and time-out devices).

Volume 3 was dedicated exclusively to restructuring of the GMRS. It recommended changing the name of the GMRS to the "Personal Mobile Radio Service", that recreational and point-to-point (fixed station) communications be prohibited, that licensing be simplified, that offset frequencies be made available, that open accessibility to repeaters be encouraged, that time limits be placed on communications, that interconnection be prohibited except when used to facilitate emergency or traveler's assistance communications, that a standardized selective calling protocol be adopted and that an aggressive user education program be established. Relevant ancillary recommendations were also made. PURAC did not recommend that commercial entities be precluded from operating in the new service, but expressed confidence that such users would relocate somewhere else when they perceived the rapid growth in personal use.

OPP Working Paper 6, Alex Felker and James Brown (August, 1981).

This report detailed the general characteristics of the Amateur, CB, Remote Control and General Mobile Radio Services. Other semi-personal radio services were also discussed, such as the Maritime Radio Services, the Rural Radio Telephone Service and the Common Carrier Services. It recommended exploring the feasibility of using spread spectrum and decentralized trunking in a 900 MHz personal service. Suggestions for improvements in the current personal radio services were also made.

Additionally, Working Paper 6 favored the implementation of a new personal radio service at 900 MHz- preferably a mix of amateur and personal users (at least in part of it) in order that more members of the public might be attracted to the Amateur Radio Service. The report envisioned competition between the new personal service and cellular service, perhaps with sharing of some frequency bands so that either systems could be readily adapted to changing customer demands, technologies and economic conditions.

First Report and Order, "Revision of Part 19, Citizens Radio Service", Docket No. 11994 (23 Fed. Reg. 2739, April 24, 1958).

Further Notice of Proposed Rule Making, "Reducing separation between assignable frequencies in the 450-470 Mc/s band", Docket No. 13847 (32 Fed. Reg. 13975, October 7, 1967).

Second Report and Order, Docket No. 13847 (33 Fed. Reg. 3115, February 17, 1968).

Recent Personal Radio Regulatory Actions (1978-1985)

PR Docket 79-140 Notice of Inquiry, (June, 1979).

Proposed creation of a new "Personal Radio Service" in the 900 MHz band. It requested information on desired performance characteristics of the new service, licensing procedures and the extent of the necessary frequency allocation. Comments were also requested on its proposed impact on other services.

Docket 79-140 Report and Order, (January, 1983).

Affirmed PRPG and PURAC conclusions that a new personal radio service was needed to meet current and future personal needs; and that the most significant personal need was for directed communications from a motor vehicle operator to specific other parties for personal, business-related and/or emergency communications. The Commission indicated that it was persuaded by the record that unfulfilled communications needs of the public did exist and that a new personal radio service that would primarily provide for directed communications from vehicles at a cost the average person can afford, merited further consideration.

Docket 83-26 Notice of Proposed Rule Making, (January, 1983).

The Commission proposed a new personal radio service in the 900 MHz band along the lines suggested by General Electric in its comments in Docket 79-140. Thus, it was proposed that the new service be named the Private Radio Communications Service (PRCS). Users would be able to communicate with their own or other PRCS users directly over distances of up to 5 miles. Interconnection would be permitted, but only at the user's premises (home). An exchange of communications would be time-limited to 3 minutes except during periods of light congestion. Repeaters would be authorized, but not permitted to link together to cover wide areas, as in cellular systems. No license would be required to operate in the new service. Those wishing to sponsor repeaters, however, would be licensed. Channel selection, selective calling, conversation duration and transmitter identification would be automatic, that is, controlled by the equipment rather than the operator.

The primary objective of the new service would be to permit the greatest number of simultaneous conversations with little or no action necessary on the part of the operator (in selecting frequencies). A combination of centralized and decentralized trunking techniques would be

Recent Working Papers & Staff Reports
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Telephone Pricing to Promote Universal Service and Economic Freedom
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NTIS # PB84 186824; \$4.50; pp. 42.

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NTIS # PB84 186790; \$4.50; pp. 43.

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with a requirement that control station power be limited to that necessary to obtain a specified amount of "quieting" at the repeater's receiver, was rejected because of the high power that could conceivably be required under such an arrangement.

Order eliminating the requirement that Part 95 licensees have a current copy of the rules and regulations (August, 1982).

Report and Order adopted in PR Docket No. 82-184 providing for the use of the Temporary Operating Permit in GMRS for a period of up to 180 days, subject to the availability of a suitable form (January, 1983). The Commission announced the availability of Temporary Operating Permit, Form 574-T, September 26, 1983.

Memorandum Opinion and Order denying a PRPG request for oral argument before the Commission in the matter of elimination of the requirement that Part 95 users have a current copy of the rules and regulations (January, 1983).

Notice of Proposed Rule Making in PR Docket No. 83-330 proposing a 10 year license term in the GMRS (March, 1983).

Report and Order in PR Docket No. 82-84 concerning update and recodification (revision into "plain language") of the GMRS rules (August, 1983).

Letter by the Chief, Private Radio Bureau, dismissing petition RM-2895 (a proposal to allow GMRS licensees the use of any of the available channels and to limit the number of mobile units operated by commercial users to 6 or less). (October, 1983).

Order dismissing petitions RM-4179, RM-4180 and RM-4592 on the basis that they were premature in light of the pending proceeding concerning the creation of the PRCS (December, 1983). (RM-4179 requested that licensees in the GMRS be able to use any of the available frequencies. RM-4180 and RM-4592 requested permission for GMRS stations to interconnect with the telephone network.)

Recent Studies Relating to Personal Radio

Alternatives for Future Personal Radio Services, by the Personal Radio Planning Group (PRPG), FCC Office of Plans and Policy (May, 1978).

The principal focus of this study was on CB radio and the creation a new service of a somewhat similar nature. The study recommended no single response to demand for personal radio communications. Rather, it proposed six alternatives for Commission consideration in the event the Commission decided that the creation of a new personal radio service was appropriate.

The Personal Use Radio Advisory Committee (PURAC) Report (April, 1978).

PURAC, an FCC-chartered committee composed of interested communications industry professionals, personal radio users and FCC personnel, was formed in 1976 and in April, 1978, issued a three volume

