

APCO REPORTS



ASSOCIATED PUBLIC-SAFETY COMMUNICATIONS OFFICERS, INC.

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APCO's message that state and local governments would be hard-pressed to fund new microwave systems if forced to move from their 2 GHz spectrum allocations was heard at the Federal Communications Commission. The Commission, suggesting an allocation of 220 megahertz in 2 GHz bands for new, emerging technologies, also has proposed grandfathering current state and local government 2 GHz licensees in the band for an indefinite period. While new users of the band will be allowed to negotiate buy-outs of existing licensees, no state or local government microwave user will be forced to move from assigned frequencies, according to the proposal by the Commission. Commercial users (utilities, railroads, etc.) of the band will be co-primary only for a defined period, after which they will become secondary and subject to displacement without compensation.

In another spectrum-usage matter, APCO has responded to the Notice of Inquiry (PR Docket No. 91-170) in the matter relating to "refarming" of the spectrum below 470 MHz. Pledging its full support to the Commission in the effort to analyze current and future spectrum needs, APCO filed comments January 21 requesting that the unique requirements of public safety be kept in mind as the Commission reviews all responses, "and as may be necessary, to treat this service in a separate and different way."

MICROWAVE OPERATION COULD CONTINUE INDEFINITELY ON PRIMARY BASIS: The proposed allocation of 220 megahertz of spectrum between 1.85 and 2.20 GHz for emerging telecommunications technology was announced January 16. All four Commissioners who were present for the announcement (Commissioner Sherrie Marshall was absent) commented on the importance of accommodating existing users, especially state and local government. The announcement came just a few weeks after APCO testimony at an FCC hearing on the matter. (A report on the testimony was in the November 1991 issue of APCO REPORTS).

The Commission, to minimize further the costs to existing licensees and disruption of service, proposed: 1) Allowing existing facilities to remain co-primary with the facilities of new services for a fixed time, such as 10 or 15 years, alternatively, adopting a phased approach in which specific blocks of spectrum would be made available for new services over time; 2) Allowing existing facilities to continue to operate on their currently assigned frequencies after the end of the transition on a secondary basis, and 3) Permitting state and local government fixed microwave facilities to continue to operate on a primary basis indefinitely. Finally, pending the outcome of this proceeding, the Commission announced that it will authorize new fixed microwave facilities on the 2 GHz frequencies only on a secondary basis.

Public safety observers said the major drawback to the proposal appears to be that any new microwave licensee (including those for expansion of existing systems) would be granted on a secondary basis to new services. This would apply to all microwave users, including state and local government. In addition, there may be some interference problems created by having both new mobile and pre-existing microwave users operating on the same band.

'REFARMING' SPECTRUM BELOW 470 MHZ INVOLVES FINANCIAL CONSIDERATIONS: APCO, attempting to address the NOI's questions as they relate to the public safety portion of the spectrum below 470 MHz, commended the Commission for recognizing that changes are both necessary and timely. "Unfortunately, from a financial aspect there could not be a worse time. Just as with the federal government, local and state governments are finding funding very difficult. Funds for major changes in existing systems or conversion to new technology will be extremely difficult to obtain."

"Although massive changes may be needed and in order," APCO said, "they cannot occur unless there are adequate funds. APCO urges the Commission to keep this in perspective when reviewing all comments."

The salient points in the NOI and APCO's response may be summarized as follows:

1. Rule changes are timely and should be considered.
2. Rules should be strong and definitive, while at the same time providing maximum flexibility in allowing the user to choose the type of system best suited for their needs.
3. Rules should recognize the differences in service and in geographic and demographic divisions. The same set of rules will not necessarily fit all services nor all areas of the country. The priority of public safety needs must never be forgotten.
4. Major changes, such as complete re-assignment of a band, which would cause catastrophic disruption of existing systems and cost millions of dollars, is not feasible. Conversely, minor changes to improve block allocations and improve spectrum efficiency are in order.
5. Spectrum efficiency is a paramount concern, yet the present spectrum cannot possibly provide for the needs of public safety either in the near or distant future. Additional spectrum will be required. Although not a part of this NOI, further sharing in the television broadcast portion of the spectrum appears to be the best possible solution.
6. New technology, including, but not limited to digital modulation, is here today, and should be utilized to the fullest extent.
7. Certain bandwidths could, and should, be reduced. Some changes could be considered for immediate change, while others must be considered over a longer period of time.
8. The Commission should place full reliance upon the frequency coordination groups, take steps to ensure their viability and support their effort to recommend spectrum-efficient systems. This includes authority to limit system coverage in the Public Safety Services to their primary area of political jurisdiction, with a relatively small overlap in recognition of the irregular shapes of areas, and the need for communications outside the area in emergency situations.
9. Consider the National Plan/Regional 800 MHz Public Safety Planning process as a possible model for plotting and administering all public safety channels in the future.

MIGRATION TO HIGHER FREQUENCIES HASN'T ALWAYS RELIEVED CONGESTION: APCO said that for the most part, migration from frequencies below 470 MHz to higher frequencies has not relieved congestion, but merely kept pace with increased need. Development in the UHF television channels and 800 MHz portions of the spectrum have been primarily for expansion and for new services. As large trunked systems are developed utilizing the new 821-860 MHz National Plan Public Safety channels, some frequencies below 470 MHz will indeed be released for use by other public safety agencies. However, this will not have a major impact on channel congestion, APCO said, and further relief will be necessary. "It is hoped and anticipated that new techniques will result in narrower channels and that certain rearrangement of channels as a result of this Inquiry will also provide a measure of relief," APCO said.

"Ultimately, however, the Commission will need to allocate additional spectrum for public safety use to alleviate congestion. Even with spectrum-efficient technologies, there is simply not enough spectrum available to meet current and future public safety needs, especially in major metropolitan areas." The Notice mentions the Private Radio Bureau's 1985 report on future public safety requirements (PR Docket No. 84-232) and the Commission's subsequent allocation of six megahertz for public safety use. "That allocation, however, did not even meet the needs identified in the Bureau's 1985 report, and it is far less than current estimates," APCO said. "The Commission must do more to meet its statutory obligation to identify and meet the spectrum needs of services that protect the safety of life and property."

APCO said rules governing land mobile usage below 470 MHz have continually been changed to keep abreast of improved technology and to cope with dramatic increases in spectrum use. Many of these changes have been of the band-aid type, perhaps effecting a short-term fix or improvement, but ultimately resulting in unforeseen complications, APCO said, adding that "hopefully, this Inquiry will lead to more-lasting solutions to serious spectrum shortages."

SOME PROPOSALS IN THE NOI ARE 'UNREALISTIC': Saying that some of the proposals are "unrealistic," APCO pointed out that clearing out the entire spectrum and re-assigning frequencies and channels, both in the light of current needs and in recognition of existing technology, could potentially result in far-better spectrum utilization, but from a practical standpoint this cannot be accomplished. "This and other proposals in the Notice may be more idealistic than realistic. However, they provoke interest and challenge the imagination, and the responses generated should help not only the Commission, but land mobile in general to establish priorities and plot a course for the future," APCO said.

The Commission statements in the Background section of the NOI indicate a keen awareness, APCO said, of the crowded condition of the spectrum available to land mobile, and while the NOI deals primarily with current allocations, "it is clearly evident that additional spectrum must be found for the future needs of the PLMR service. Perhaps some channels may be found below 470 MHz, but the entire usage and assignment of higher portions of the spectrum must also be considered."

APCO'S ANSWERS TO QUESTIONS ASKED IN THE NOI: (Questions will not necessarily be restated in whole, but may be abbreviated or otherwise abridged).

QUESTION 1: TRUNKING

Should trunking be allowed below 470 MHz and should separate rules govern the two types of trunking? APCO recognizes the value of trunking for certain applications. However, for public safety use there is, and will continue to be, a strong and definite need for conventional systems. Some type of exclusivity in both trunked and conventional systems must be guaranteed in a public safety system to ensure absolute reliability and immediate access to a channel when life or property is in immediate danger. "Dynamic" trunking would not provide the necessary degree of channels access. APCO has previously gone on record as supporting trunking below 470 MHz in those instances where it is applicable. In the public safety field there does not appear to be any current wide-spread potential for use, due to the lack of exclusive channels assigned to a single user. In any particular case, a full change-out of equipment would be necessary and in most instances it would probably be more practical to migrate to the 800 MHz region to develop a trunked system. APCO continues to support flexible rules which would permit trunking below 470 MHz, provided the integrity of conventional users is maintained.

Certain rule changes would be necessary, but without exclusivity guaranteed, and adequate spectrum available, it is impossible to develop either operational or technical rules. APCO does not envision any way in which decentralized trunking could be made applicable to the Public Safety Radio Service. It may have merit for other services.

Should the Commission promote trunking? No . . . it should be permissible under appropriate rules, but public safety entities must have freedom in their choice of systems, consistent with effective spectrum utilization.

Should traditional centralized trunking be permitted in 470-512 MHz? Yes, under appropriate rules, which include, for public safety, the guarantees of an available channel as previously stated. Rules would differ in some respects from the 800 MHz rules, in particular the exclusivity based on loading and mileage separation alone. Rules must reflect sound engineering parameters, as in the Public Safety 800 MHz Regional Plans where specific signal strength contours are mandated. Loading criteria should also be changed, based on actual studies of existing systems and using a weighted curve, rather than a straight linear progression for the number of mobiles per channel.

QUESTION 2: PACKET RADIO

Can packet radio be used for real-time, digital-voice transmissions? As stated in the NOI, there is a built-in delay in what is generally known as "packet radio," and it is not suitable for "real-time" transmission. However, this technique is very useful for other purposes.

Can packet share with analog voice? Yes, under conditions which are under the control of the licensee on a channel not subject to time-shared use with other licensees. Systems must be appropriately configured, and it will not be possible to share under certain other conditions. For example, packet can be handled very efficiently on simplex channels using a "digipeater," versus requiring duplex channels utilizing mobile relay for extended area coverage.

Should the Commission promote the use of packet? As previously stated, the users must be given latitude to decide what is most appropriate for their needs. "Promotion" should be in the form of flexible rules and regulations.

Should an attempt be made to clear channels for dedicated use of packet? APCO will address the use of dedicated channels for any purpose in further detail below. While there is some merit to the idea of dedicated channels, particularly for disaster situations, needs vary dramatically from urban to rural and from one portion of the country to another. There should be more decision making at a local or regional level in this and other spectrum management areas to ensure most appropriate spectrum utilization.

QUESTION 3: SPREAD SPECTRUM

Should spread spectrum be permitted on older PLMR bands? Again, rules should be flexible to provide for local option. There is not enough known about the value and effect of spread spectrum shared use to discuss technical standards at this time. APCO is concerned with the potential for interference to existing systems if spread spectrum is overlaid on portions of the spectrum. Certainly there will be some detrimental effect as the number of units and systems increase. Speculation ranges from an increase in the noise floor to bit loss in proposed digital systems. Spread spectrum requires large bands of contiguous channels to be effective. Any attempt to promote or encourage a major use of spread spectrum must be carefully considered and supported by in-depth research and testing.

Can spread spectrum be successfully used by PLMR on a secondary basis? Same as above. Extensive field testing will be necessary before this can be determined. Over and above the consideration for interference is the performance of the equipment. Virtually all spread spectrum devices are now low power, and have limited use in wide-area public safety radio systems.

Should the Commission promote the use of spread spectrum? Same as previous comments: if it proves valuable, it will not need promotion to be adopted.

Should the Commission dedicate some band for use of spread spectrum? No, nor should specific channels be dedicated for such a use without much more knowledge of the effectiveness of the technique. If bands are to be dedicated for exclusive use, techniques, such as digital modulation, seem to offer more potential for viable systems than does spread spectrum.

QUESTION 4: DIGITAL VOICE MODULATION

What rules should be amended to facilitate the use of digital modulation? APCO, through Project 25, is currently involved with the National Association of State Telecommunications Directors and the federal government in a program to establish standards for digital voice modulation in the Public Safety Radio Service. The manufacturers are cooperating to the fullest extent. FCC staff has attended many meetings. The Commission is well aware and supportive of this Project and should allow as much latitude as possible in the use of the spectrum for testing and development. Appropriate rule changes will be in order and necessary when a consensus is reached on appropriate standards.

Should wider bandwidths be allowed? A major thrust toward the implementation of digital voice modulation is improved spectrum efficiency. All indications are that narrower bandwidths can be used, or increased usage made of existing bandwidths through TDMA. There should be no thought of allowing wider bandwidths. Even with TDMA, existing bandwidths should be adequate.

Should the Commission promote the use of digital voice modulation? The Commission should support the current Project 25 and assist as requested and required to effect appropriate rule changes. Perhaps the term "encourage" would be a better choice than "promote." *Should digital standards be developed?* Definitely.

QUESTION 5: NARROWBAND

Is FDMA on shared channels feasible? Should rules be modified? Should bandwidths be reduced below 20 kHz? APCO Project 25 has adopted FDMA as the technique most-suited for narrowbanding for digital voice modulation. Projections are promising and adjacent channel interference protection ratios indicate it should be possible to achieve a two-for-one channel split in some instances. It is premature to consider rule changes until more specific information is developed, but certainly rule changes must be made as the technique is developed. As standards are developed and manufacturers produce equipment, both for the federal government and for local government, it will become evident how channels should be split or rearranged. Migration from analog FM to digital technology will be a challenge, particularly on shared allocations. This is a major consideration in the APCO Project 25 study. Obviously, on shared channels, all users must employ equipment with compatible bandwidth capability.

QUESTION 6: OTHER TECHNOLOGIES

Are there other technologies that could be used to add a significant number of users on the older PLMR bands? Other technologies are certainly under serious consideration. Single sideband schemes, and narrowband FM show promise. Unfortunately, any attempt to interleave and share with existing assignments poses a significant problem to existing licensees. If changes in rules or bandwidths occur as the result of introduction of digital modulation, other narrowband technology must certainly be considered. However, from a public safety standpoint, intercommunications and compatibility is very important, and a proliferation of techniques is not desirable. The Commission should encourage and support research and development, but should not promote any particular technique at this time.

QUESTION 7: COMPATIBILITY

What problems might arise through the use of different technologies? This was addressed in the previous question. As stated, public safety is particularly sensitive to the need for compatibility. APCO Project 25 is specifically designed to develop standards for digital modulation to ensure compatibility and intercommunication. An attempt is being made to develop both forward and backward compatibility. Ultimately the Commission will be requested to adopt appropriate rules to support this thrust toward the standardization of public safety equipment and systems.

QUESTION 8: OTHER TECHNICAL OR OPERATIONAL STANDARDS

Are there technical or operational standards that could be modified? There are undoubtedly rule changes which could be made to promote spectrum efficiency. These include consideration of power levels and band widths. However, spectrum efficiency cannot be assured by rule changes alone. In fact, while most rules are helpful, others have a negative effect. For example, the lack of a requirement in current rules for site-specific coordination on the 12.5 kHz offset channels prevents full, effective utilization of these channels, particularly in geographic areas with wide variations in elevation. Other "secondary" uses could be made more effective by rule changes. A further example is mandatory use of coded squelch. This has been suggested, but rejected by the Commission as a "user's choice." Certain rules or laws are often enacted which are essentially for the benefit of the general public, and even the user in an "it's good for you" vein, as for example, the controversial laws mandating motorcycle riders to wear helmets.

In some instances rules could be relaxed or removed, while in other areas new or stronger rules are required. This should be a major concern in the "refarming" issue, and the Commission should maintain an open mind, not influenced by any broad effort to deregulate for the mere sake of deregulation. After extensive study, including consideration of adapting signal modulation schemes, APCO offers the following specific suggestions for reducing channel spacing:

1. VHF Low Band. This band has limited potential for use due to skip interference, antenna requirements and high noise levels. Demand is relatively low, and equipment availability is reduced. APCO has no suggestions for reducing channel spacing at this time.

2. VHF High Band. This is an extremely popular band, and is heavily overloaded. A proliferation of low-priced equipment, good propagation characteristics, acceptable noise levels and reduced antenna requirements have led to this heavy usage. Much of the loading is also due to the fact that a large number of public safety systems were built before UHF became available, and systems were not only perpetuated, but expanded. Many of these systems are in urban areas, where UHF would be a better choice. Ideally, this band would be primarily used for wide-area systems, such as county-wide or state-wide. Although the band widths were split to 15 kHz many years ago, equipment continues to be based on 30 kHz parameters. APCO recommends that technical standards be established to reduce the actual channel spacing to 15 kHz and require necessary changes in equipment and modulation to permit adjacent channel operation in identical areas without the need for geographic spacing. This should commence immediately, with appropriate time frames established for change-out of existing equipment.

3. UHF 450-470 MHz. Reduce the 24 kHz channels to 12.5 kHz channels and establish technical standards which will make all channels co-equal. The establishment of 12.5 kHz offset usage on a secondary basis has been well-accepted, and usage is very heavy in many areas. Site specific coordination was not provided by the rules, and many of these channels are being used for fixed operational purposes. An effort should be made to find other suitable spectrum for these low-powered RF links. Even though granted on a secondary use basis, many of these systems are indispensable, and cannot be displaced without a major impact on users. This must be a consideration in the reduction of channels to the recommended 12.5 kHz spacing. For this reason it is impossible at this time to recommend a suitable time frame.

4. Although not specifically included in the NOI, APCO recommends that the Commission strongly consider splitting the 470-512 kHz TV shared channels to 12.5 kHz channel widths. This could be accomplished without a major impact. Technical standards would be the same as those for the 450-470 region. This could be accomplished in the near future, with appropriate time frames for conversion.

As technology develops, rules must be changed to reflect advancements and to ensure appropriate and full application of available equipment. It will be necessary to develop and regulate technical standards relative to stability and spurious emission as channels are narrowed. Equipment must be type-accepted to meet adjacent channel protection ratios to ensure success in allocation plans utilizing narrower channels.

How should equipment be authorized under flexible standards? As stated in the previous response, type-acceptance of equipment and rules ensuring compliance with prescribed standards will be even more important as technology advances, and the Commission must be in a position to accept this responsibility. Checks and balances must always exist to prevent over-regulation which could inhibit development of improved technology and equipment.

QUESTION 9: EXCLUSIVITY

Should one or more bands be converted to exclusive use? As previously stated, public safety must operate on a quasi or *de facto* exclusive basis. Time-sharing between individual and separate licensees is virtually impossible, as there are no practical means of establishing priorities, and vital communications could be destroyed. Thorough and effective coordination of frequencies is essential to avoid destructive interference while at the same time making the most effective use of the spectrum through sharing on a non-destructive interference basis. The questions referring to exclusive use by specific rules are more pertinent to services other than public safety. However, converting an entire band, however desirable, would seem to be impractical from any viewpoint.

APCO strongly supports the "exclusive" pool allocation concept as the only way to ensure the acquisition and protection of channels for the vital public safety services. Unfortunately, the present random allocation of various services within a single band poses an adjacent-channel problem, particularly when splitting channels to narrow band is considered. Effective mobile relay use is inhibited by the lack of standardized spacing and paired channels in the VHF portion of the spectrum. While reorganization would be traumatic, it certainly merits consideration and examination, particularly if changes in existing service pools are to be considered.

It is readily evident that the Public Safety Radio Services must undergo any and all changes with a minimum of disruption to existing systems. There is a continuing need for expansion, and provisions must be made for new systems, due to demographic changes and for similar reasons. Emptying a band or stopping new licensing in the Public Safety Radio Services could have catastrophic consequences.

How could shared use of "uncapped" channels be converted to exclusive use? The discussion in the NOI relative to this issue does not seem pertinent to the Public Safety Radio Services. In this service, coverage requirements are basically delineated by the agencies' areas of political jurisdiction. Assignments are then made on a "quasi exclusive" basis to ensure operation without destructive interference. Exclusive use of a single channel, or group of channels based on loading criteria alone should be avoided, but if based on need, usage and other pertinent factors it becomes a necessity for public safety systems.

Discuss major details of converting. Major details are difficult to specify at this time. Any attempt to change current allocations is certain to meet with protest from those affected in an adverse way. This cannot be avoided, and every possible care must be exercised to avoid disruption of vital public safety systems in the process. Cost is also a major factor, particularly to tax-supported public safety users who have no method for recovering costs. Through the personalized approach to frequency

coordination that APCO maintains, using Local Advisors, good success has been realized in many areas in sharing the 800 MHz Public Safety Pool channels. Even though exclusivity is based on loading and separation, agencies have agreed to share if assured there will be no destructive interference.

If channels are converted to exclusive use, is there a potential for monopolization? It is recognized that the Commission is primarily thinking of commercial users when the term "individual markets" is used in the NOI. This does not appear to pertain to public safety services.

QUESTION 10: FEES

Should the Commission seek permission from Congress to establish fee structures? APCO has repeatedly gone on record as opposing fees of any type, in any amount, for the use of the spectrum for public safety purposes. APCO has also expressed this view to Congress. It would be inappropriate for APCO to discuss whether or how fees should be charged to other services.

Fee Discussion. In exploring this issue, the Commission is again considering imposing a monetary factor on the acquisition and/or use of the spectrum, or otherwise recovering the costs it may incur in doing its job of administering the portion of the spectrum assigned to the oversight of the Commission. The core of APCO's adamant opposition to such an approach, no matter what form its specifics may take, is that the services to the public which any public safety agency is by statute required to provide are for the benefit of the entire population of the United States. This is true, precisely as in the uniform emergency telephone number 9-1-1, whether the people being protected are living in a specified area or are just passing through . . . It is unconscionable, and unconstitutional, for the federal government to tax its statutory partners in the preservation and protection of life and property in any way for a tool which they must have to do what they, by law, must do.

QUESTION 11: BAND LICENSING

Should permission be granted to operate on bands rather than individual channels? Using current techniques there is no apparent way in which band licensing could be practical or useful for public safety communications systems. This applies in particular to spread spectrum overlay on existing services. APCO maintains that public safety must be exempt from band licensing.

QUESTION 12: INTERSERVICE SHARING

Should interservice sharing be expanded? Should some of the 19 PLMR services be consolidated? APCO has often expressed concern for permitting interservice sharing between commercial type services and public safety services. Vast differences in the availability of funding between commercial entities and public agencies, as well as other factors, make this virtually a one-way situation, endangering current and future uses of public safety spectrum. APCO again strongly protests any suggestion of such unilateral interservice sharing. Conversely, as long as block allocations remain in the Public Safety Radio Services, interservice sharing between the individual public safety services is viable and effective.

The block allocation plan was established many years ago. It has served a very useful purpose, but experience indicates that it may be timely to explore modifications in the system. Geographic and demographic variations result in major differences in spectrum requirements for public safety radio systems — from urban to rural environments, from region to region and state to state. A block allocation which is inflexible is not the most effective method of managing the spectrum. Interservice sharing offers some relief, but there may be better options. Consolidation of some blocks within broad categories may be appropriate.

. . . There is only one reason why existing public safety allocations below 470 MHz could not be converted to a single public safety pool . . . Every individual service must have confidence that their interests would not suffer and that their existing channels would not be placed in jeopardy. This is a valid concern, and APCO, although its members are composed of representatives of all public safety services is not certain all these services would be willing to support a single-pool concept *per se*. It is imperative that existing systems, particularly those designed for wide-area operation, continue to be protected for their exclusive use by the services for which they are operated. It is equally important that each individual service can be assured that their future needs will have the same priority they would have through an exclusive service allocation.

The present system of frequency coordination by individual services does much to provide this needed assurance . . . There has been little, if any, dissatisfaction expressed with the service provided by APCO as the sole coordinator for the 70-channel, 800 MHz Public Safety Pool, and systems have been built for the exclusive use of Police, Fire, Highway Maintenance, Forestry Conservation and Special Emergency.

The new and innovative method employed in the development of the Public Safety Regional 800 MHz plans, where coordination takes place during the planning process and continues under a representative committee, is perhaps the most effective of all. Combining all separate public safety services below 470 MHz into a single pool and recognizing regional differences merits serious consideration, providing a process similar to the 800 MHz Regional Plan with strong representation from all services, is established under appropriate rules.

If services are to be combined, rules must be adjusted to provide maximum flexibility and to recognize and protect any

and all existing dedicated assignments as well as those specifically identified for wide-area systems and mutual aid and coordination purposes.

QUESTION 13: PRIVATE CARRIERS-SHARED USE

Would private carriers improve or reduce spectrum efficiency? Should non-eligibles be allowed to serve eligibles? APCO has consistently opposed private carriers holding licenses on public safety or special emergency channels. The integrity of vital public safety systems can only be ensured by keeping full responsibility in the hands of the entity. While private carriers would undoubtedly strive to place more users on a channel, spectrum efficiency cannot be measured by channel-loading alone. The assurance of a clear channel in an emergency and of a system providing effective communication is the ultimate in spectrum efficiency from a public safety viewpoint. This can only be achieved by placing the full authority in the hands of the responsible public safety agency.

Non-eligibles should not have access to public safety channels under any circumstances, except as prearranged for coordination in emergency situations. This is permitted under current rules (90.421). Conversely, public safety should be allowed to receive service from non-eligibles on their channels if this would improve the public safety mission. Under present rules, certain public safety agencies are eligible both on public safety channels and certain non-public safety channels. This eligibility should be examined as a part of this Inquiry and either expanded or reduced as pertinent.

QUESTION 14: POWER REDUCTION

Should maximum power be reduced? Which frequencies? How much power? Field intensity of radiated signals, just as in the broadcast spectrum, determines the degree of frequency reuse and adjacent channel protection. Power output or even Effective Radiated Power (ERP) is misleading. ERP may appear high when a directional or a down tilt gain antenna is used to reduce field intensity in a particular direction. Emphasis must be placed on effective coordination, supported by sound engineering, to limit coverage to the area of responsibility of the licensee.

This is the method employed in the Public Safety Regional 800 MHz plans, and it is the only sure way of ensuring maximum spectrum reuse. Shaping antenna patterns can often be more effective than merely reducing power. Resultant field intensity, regardless of the method used to achieve required levels, is the best measure of potential frequency reuse.

Today, most public safety systems are designed to enhance portable radio communications. It is impractical to use mobiles with excessive power and may result in unnecessary field intensities. Sound engineering and balanced systems must always be the goal. Appropriate rules, either as prescribed by the Commission, or as established through regional groups similar to the Public Safety Regional 800 MHz Plans, are needed to oversee and enforce this requirement for minimum field intensities.

Placing absolute reduced power limits alone could prove to be a disservice in many rural areas with difficult coverage problems, and where multiple low-level sites are either impractical or impossible. Frequency shortage may not be as acute in some of these areas, and more latitude can be allowed. Rules must be flexible enough to recognize these varying requirements and channel availability. The Commission should support, and even insist, on frequency coordination and/or regional planning which will provide the very best spectrum efficiency, and then make rule changes as necessary to achieve this result.

QUESTION 15: SPECTRUM EFFICIENCY STANDARDS

Should spectrum efficiency standards be established? Should current licenses be required to convert to more spectrum-efficient techniques? When? Spectrum efficiency standards should definitely be established. However, such standards are integral to the entire parcel of rules and regulations. They include equipment standards, such as frequency stability and spurious emission, control of field intensity patterns and appropriate bandwidths, consistent with the state of the art. They should be applied to all PLMR services, with appropriate variations to reflect the differences in the services.

Public safety systems are funded by the public, and sufficient time must be provided to amortize equipment costs. Improved design has resulted in long-lasting equipment, and the primary impetus for conversion is to obtain additional spectrum or to employ improved and enhanced technology. Conversely, if reducing interference and excess coverage through the use of lower field strength intensity is possible, there should be a definite time period established for conversion. In addition to a specified date, this should also be when any major changes in equipment take place, when channels are added or if interference occurs. There should be an appropriate "grandfather" period, perhaps five years, to bring existing systems into line. It is obvious that if a band, or portion of a band is to be shared with advanced equipment which requires reduced bandwidths, there must be some realistic time elements specified for changing out existing equipment to provide for effective migration.

QUESTION 16: UNLICENSED ACTIVITY

Would any of the changes discussed result in major changes in the level of unlicensed activity? In the public safety bands, unlicensed activity is relatively low. APCO, through its exclusive data base and local advisors, consistently attempts to validate public safety licenses. Much unlicensed activity is the by-product of manufacturers producing frequency-agile transmitters.

The problem is exacerbated by the ever-declining capability of the FCC Field Offices to monitor, track and find such activity. APCO does not envision any way in which the concepts discussed herein would materially change this level of

unlicensed activity, and this should not be a consideration in any proposed changes. In fact, as systems become more sophisticated, equipment will be harder to obtain for illegal operation, and violations could actually decline.

APCO does not envision any changes in technology or procedures which will reduce or eliminate the need for licensing. A viable licensing program is the only way to ensure compliance with rules and regulations and protect the integrity of the spectrum for public safety and other land mobile usage.

APCO 1992 REGIONAL CONFERENCE SCHEDULE

• March 9 - 12 • Gulf Coast • Nashville, Tennessee

At the Stouffer Nashville Hotel

For Information, Call 800-824-1850

• April 12 - 15 • North Central • St. Charles, Illinois

At the Pheasant Run Resort and Conference Center

(Convenient to Chicago's O'Hare International Airport)

For Information, Call Conference Chairman T.G. Mieure, 708-244-1132

Exhibits Chairman Lou Schoenfeld, 312-744-8568

• May 17 - 20 • East Coast • Lancaster, Pennsylvania

At the Lancaster Host Resort

For Information, Call Conference Chairman James Giannini, 215-631-6500

• November • Canada Regional • Location to be Announced

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