

FOR OFFICIAL USE ONLY

UNAUTHORIZED DISCLOSURE OF THE CONTENTS OF THIS DOCUMENT
IS PROHIBITED BY §19.735-206, FCC RULES

FEDERAL COMMUNICATIONS COMMISSION

Agenda Item

Item Number:

Agenda Title:

Meeting Date: November 23, 1983

Print in FCC Reports: Yes No

Type of Meeting: Open Closed

Date: November 15, 1983

From: Chief Scientist

Subject: Associate with Private Radio Bureau item "Future Private Land Mobile Telecommunications Requirements Final Report, PR Docket 82-10" and the Office of Plans and Policy item "Spectrum Management Alternatives."

Administrative Resource Impact: NONE

OST has reviewed the PRB report on "Future Private Land Mobile Telecommunications Requirements, and the two OPP reports "A Framework for a Decentralized Radio Service" and "Implementing New Technology in the Land Mobile Radio Services," which are being presented to the Commission as information items along with the OST report "Analysis of Technical Possibilities for Further Sharing of the UHF Television Band by the Land Mobile Services in the Top Ten Land Mobile Markets." None of these reports require Commission votes or other actions at this time. However, we believe that the four reports, taken together, are the beginning of an important long range discussion of how to achieve a rational balance between land mobile, television, and other spectrum needs up to about 1 GHz.

In view of the importance and scope of the expected discussion over the next months -- even years -- OST would like to take this opportunity to comment on some technological aspects of the OPP and PRB reports. Our comments go primarily to the PRB report, since the implementation of technical developments that we can anticipate will have a more direct impact on actions the Commission could take on the basis of that report and the ensuing public discussions. The following sections enumerate our basic concerns:

1. We believe that the technology projections contained in the report are generally too pessimistic on equipment availability and its impact on spectrum needs and neglect the close relationship between equipment development efforts and the regulatory climate. We expect that no single new technology can be both suitable for all types of users and be spectrally efficient.^{1/} However, we feel that the opportunity exists to use a combination of approaches to increase greatly the efficiency of most users. Although, such new systems may be qualitatively different from current FM voice systems and may have different costs, this does not mean that they are inappropriate for the users.

At present the regulatory climate discourages the development of new PLMRS technology in this country, in that users are permitted few if any technical options and given few incentives for efficiency. Indeed, even though the U.S. is the leader in most communications technologies, foreign firms have been the leaders in many recent commercial land mobile radio innovations such as digital dispatching and narrowband FM. There are also many new communication technologies which have been developed in the U.S., but which have not been marketed for the PLMRS market.^{2/} We feel that the Commission can create a regulatory climate where these new technologies would become available for PLMRS users. Such regulatory climate would also have the side effect of increasing the competitive position of the U.S. communications electronics industry in the world market.

2. The alternatives proposed by the report to meet the spectrum "shortfall" (p.3 of the report) are only traditional in nature and do not reflect the current deregulatory thrust of the Commission. The alternatives fall into two general categories: Reallocating spectrum to the PLMRS from some other service or mandating specific, new, improved efficiency technologies (such as trunking or ACSB) for the PLMRS. In addition to these traditional approaches, there are two deregulatory tools which we feel should also be considered. These are the concepts of technical flexibility and incentives. In this

^{1/} We note, for example, that the trunking technology that is presently available, if extended to all PLMRS bands would increase communication capacity enough to handle most of the bureau's projected growth to the year 2000. While not all PLMRS users may find trunking completely suitable for their applications, the PRB report cites other technologies which contribute to the same goal. For example, digital dispatch systems have a spectrum efficiency improvement of a factor of 3-6 (p. 4-37) and packet radio/switching systems can contribute a factor of 3 (p. 4-36). More detail on our review of the potential impact of trunking is given in Attachment I.

^{2/} These include packet radio, efficient digital modulation techniques such as minimal shift keying and 8-ary modulation, adaptive antennas, forward error correcting coding, and linear predictive coding.

area, we are in general agreement with the views of OPP on technical flexibility as expressed in paragraph 21 of their item and with the flexibility suggestions of PRB as expressed in the first and fourth conclusion points on p. 6 of their item.

Technical flexibility permits the licensee to use any available technology as long as he meets certain interference constraints as opposed to the traditional approach of enumerating allowed types of systems. This approach has been very successful in Part 25, Fixed Satellite Service and, in the past two years, has been extended to certain PLMRS channels at 900 MHz in Docket 79-191 (§90.645) and extended to Part 22 (RCC) licensees in Docket 80-57. The concept of technical flexibility has been discussed in depth in the recent OPP report entitled "Implementing New Technology in the Land Mobile Radio Services," September 1983. OST is presently exploring in Docket 83-114 the feasibility of extending this concept to the bulk of the PLMRS channels.

Incentives involve giving licensees a positive reason for making a marketplace choice among spectrally efficient systems, recognizing that efficient hardware is generally more expensive than traditional hardware. Such incentives could involve permitting licensees to sell excess capacity or permitting multiple users to subdivide a channel into exclusive subchannels for each of them.^{3/}

Technical flexibility and incentives are simplest to implement when a channel has only one licensee, as in Part 22 and in the §90.645 channels. However, we feel this concept can also be useful for the shared channels that are common in most of the PLMRS and that the Commission should seriously explore these options. We have recently received the reply comments in Docket 83-114 and plan to present to the Commission early next year a further notice in this proceeding with specific technical flexibility proposals.

3. The data used -- the only data available -- and the analysis methodology tend to overestimate the demand which is assumed to be independent of regulatory action and not cross-elastic with RCC services. However, much of the new data used came from licensees who have no incentives to moderate their demand projections.^{4/} Private land mobile demand has been highly correlated with spectrum

^{3/} One possible approach to incentives is given in the OPP report entitled "A Framework for a Decentralized Radio Service," September 1983. While this report discusses an incentive system in which a piece of spectrum could be used by a wide range of broadcast and land mobile services, it is also possible to have incentive schemes in which flexibility is more limited, e.g., to land mobile users only.

^{4/} We should note that the difference between our view of the data and PRB's is quantitatively small compared to the differences between our respective views on the impact of new technology in reducing spectrum needs.

availability; indeed it may be that virtually any spectrum allocations will become self-fulfilling prophecies. (That is, demand will either fill up any spectrum made available or the demand will fit into existing spectrum if no other alternative is available and users can convert to more efficient technology.) Many private services can be expected to be cross-elastic with more expensive RCC services. Existing Private Land Mobile Radio Service (PLMRS) spectrum could be used more intensively if users had more efficient (and generally more expensive) equipment. In seeking ways to meet the long range PLMRS demand, the Commission will ultimately have to decide whether it is in the public interest to hold down the cost of mobile service to Private Land Mobile Radio Service (PLMRS) users by reallocating spectrum from other services which also have a value to society or to rely in whole or in part on other approaches.

The issue of future land mobile requirement is a critical one for the Commission as the status quo with existing spectrum and the existing mix of technologies is probably unable to meet long range growth. To assist the Commission and the land mobile community in considering all options, OST has released or will shortly release reports in the following areas, summaries of which are attached to this item:

- a) Digital Radio Technologies: This report shows that the technology exists to improve significantly the spectrum efficiency of the PLMRS, although such systems will have different characteristics than today's FM voice and may be more expensive. OST and PRB agree in general on the impact this technology could have, but disagree on the time scale of its availability. ("Digital Technologies to Increase Spectrum Efficiency in the Land Mobile Service." Attachment II)
- b) TV receiver technology and UHF spectrum management: This report summarizes FCC-supported work on UHF-TV receiver technology and its possible impact on reducing the UHF taboos. Taboo reduction in turn could lead to more broadcast stations or more spectrum sharing with land mobile. ("Advanced Technology UHF Receiver Study Part 2 Effect Upon UHF Television Allotments." Attachment III)
- c) Amplitude compandored single sideband radio test results: This report presents laboratory test results of available ACSB radios and conclude that they can provide a viable service. Data is presented that will be the basis for designing specific rules for ACSB use. ("Amplitude Compandored Sideband Compared to Conventional Frequency Modulation for VHF Mobile Radio-Laboratory and Test Results," FCC/OST TM83-7. Attachment IV)
- d) LPTV/Land Mobile sharing tradeoff studies: This report is discussed in a separate item on today's agenda and shows the options available for increasing land mobile sharing of the UHF-TV band. ("Analysis of Technical Possibilities for Further Sharing of the UHF Television Band by the Land Mobile Services in the Top Ten Land Mobile Markets," FCC/OST R83-3.)

- e) Adaptive antennas: This report shows the potential for decreasing repeater spacing (and increasing frequency reuse) by using a version of this technology which was developed for military use. OST plans to verify the conclusions presented here with experiments this year if we can borrow the equipment from the Army. ("The Potential Use of Adaptive Antennas to Increase Land Mobile Frequency Reuse." Attachment V)

These reports illuminate several aspects of the long range PLMRS problem. We would be glad to discuss any of the reports in more detail and would welcome requests for further study in specific areas to support policy formulation.

We support the PRB proposal to form an advisory committee to examine the long range PLMRS issue. We and the Bureau agree that the committee should include members who can be expected to bring the implication of new technology to the attention of the committee.

Finally we feel that new deregulatory approaches as outlined above should be examined further. We plan to present the Commission with a Further Notice of Proposed Rule Making in Docket 83-114 as a vehicle for exploring these approaches within the next few months.



Robert S. Powers
Chief Scientist

Attachments

Michael J. Marcus/Rm. 7202/(202) 632-7040

