DRCP SUMMARY AND COMMENTARY

RE REPORT SUBMITTED

UPON COMPLETION OF

CONTRACT 36100-6-0555

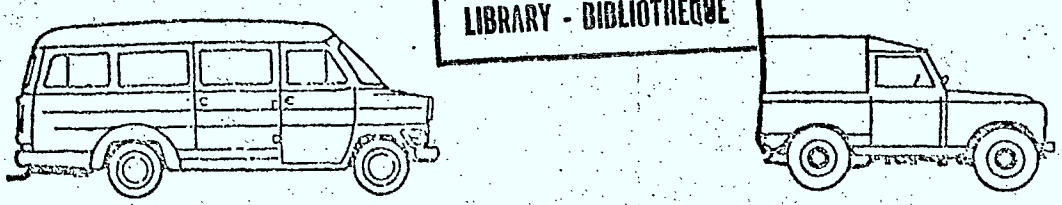
"MAN ON THE MOVE"

OR

"A USERS SURVEY OF MOBILE RADIO SERVICES IN RURAL AREAS OF THE PRAIRIE PROVINCES"

completed by C. Roger Schindelka, Institute for Northern Studies, University of Saskatoon, Saskatoon.

G.D. Cormack
DRCP



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MEMORANDUM **NOTE DE SERVICE**

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SUBJECT / *OBJET*: Summary of "Man on the Move" or "A Users Survey of Mobile Radio Services in Rural Areas of the Prairie Provinces" final report by the Institute for Northern Studies, University of Saskatchewan, contract no. 01SU 36100-7-0307

The original report upon which this summary and commentary is based is 1570 pages in length and includes a breadth of coverage of this topic that is impossible to condense to satisfy all potential readers. Therefore, the interested person may decide, on the basis of depth of interest, to chose between:

i) this summary and commentary, which is to be distributed fairly widely.

ii) a copy of a 300 page condensed version of the report, as attached. This version consists of the contractor's results given in chapters 1 to 14 and a copy of Appendix E which contains the down-to-earth and business-like yet folksy comments of mobile radio users. The portions of the original report that are omitted include computer programs and various Appendices on analysis techniques.

iii) coded responses to questionnaire, on magnetic tape.

iv) the complete report, available on loan.

The original report has been done under contract for DOC under the sponsorship of the Rural Communications Program and has provided members of DRCP with a clearer picture of the evolving and ever-increasing role that mobile communications is playing in the every-day life of the rural people in Alberta, Saskatchewan and Manitoba. Appreciation is extended to the Institute for Northern Studies and in particular to Roger Schindelka for his tireless efforts in accepting nearly total responsibility for all phases of this work. Although this report is of obvious use to the members of DRCP, it should be pointed out that others also should find use for its topical material. For example, the business orientation of rural GRS users and indication of friction between non-business and business users may be of interest to our spectrum management people regarding the possibility of a BRS (B for business). Similarly the GLMRS commentary has been received with interest by telephone company personnel and the cost concern of Private licensees should be of interest to the mobile radio industry. The fact that the majority of the information presented and analysed was solicited from the end-users, the actual people who operate the equipment, provides a clearer picture of the individual needs than had hitherto been obtained.

GDC/jm

G.D. Cormack

Chapters 1 and 2 - Introduction

This contract is concerned with mobile radio services in the rural areas of the three prairie provinces. The objectives of the contract have been:

i) to identify the socio-economic-geographic characteristies of users,

ii) to identify user complaints and preferences,

iii) to analyze communications patterns of users and

iv) to estimate future needs.

Although GRS, private mobile systems and mobile radio-telephone services have received the greatest emphasis, many of the characteristies of RCCMRS and paging licencees are also described. The report elucidates the interplay between mobile radio usage patterns and a large number of the factors affecting these patterns. Three data sources were employed: mailed questionnaire responses (3630 sent out, 1440 replied) personal interviews (about 60) and Statistics Canada information. The report is enriched with factual data and commentary that obviously come from the personal background of the author who has not only had access to the prairie geographical/economical/sociological expertise of the Institute for Northern Studies but has also spent most of his life in rural Saskatchewan.

The subtitution of capital for labor has resulted in a redistribution of work activities and density of people in rural Canada. These changes in occupance have important implications with respect to future provision of services and the expansion and contraction of settlements.

The greater accessibility of some places over others is a reflection of the uneven distribution of transport lines and terminals. The shape of any future communications developments will of necessity mimic the future population which is generally characterized as becoming increasingly mobile, both socially and physically and as possessing an increasing amount of leisure time.

Vertical integration, corporate structure, contract farming and specialized agricultural units are all seen to be evidence of farm modernization. But it must be remembered that all farmers operate within the same marketplace. Those dynamic farmers that adapt to new situations are those that prosper. Those farmers who fail to adapt will become less financially solvent.

Four factors which are seen to play a role in determining future developments are needs, technical possibilities and barriers, economic constraints and legal or organizational barriers. The present categories of need which are being met by mobile services are safety, efficiency and convenience.

Chapter 3 - Insights

This chapter investigates mobility as it relates to communications. The common element is seen to be that of need for interaction, which is created by movement and satisfied by communication linkages.

The tendency toward agglomerations of activities at a small number of locations promotes the realization of "agglomeration economics" through shared costs (police protection, trash removal, etc.).

The economy of scale refers to lower unit costs due to larger volumes of output and are realized through the formation of larger establishments.

The ability of a commodity or a service to satisfy a human need is termed utility. The fundamental causes of movement are the creation of place utility which is further enhanced by time utility.

A characteristic of modes of interaction is the "action space" within which the interactions occur. Any individual has the greatest interaction requirements and the largest action space during the working years. Establishments generate and receive more movement as they grow.

A cursory examination of those individuals who use mobile radio services reveals that they are engaged in the production and distribution of goods and services, to a large part, as opposed to the consumption of goods and services. In general, experience demonstrates that three radio-equipped vehicles can do the work of four vehicles without radios. Translated into a benefit/cost ratio the benefits which can be realized are in the neighbourhood of 8 to 1 (Cohn, 1973).* A mobile communications system operating in a farm environment serves to coordinate a fixed number of workers (often a farmer, his wife and seasonal help) efficiently and to minimize breakdown delays.

Chapter 4 - The People and Their Resources

It has been hypothesized by Zimmerman and Moneo (1970)** that there exists a series of farm-city dominated community systems in the prairies. Within the community system there exists symbiotic relationships between different segments of the population. A typical farm-city encompasses 15,000 people and covers an area of about 2500 sq. miles.

Changes in employment structure which have been experienced up to now are usually accredited to the technological improvements in agriculture which, by reducing the need for agricultural labour, have led to heavy population movements from rural to urban areas. Forecasts of future employment trends point out that the tertiary or service industries will be the major source of growth. But these services are related in large measure to population, and therefore this growth will be predominantly urban based. It is reasonable to assume that whatever the direction of change in the prairie economy as a whole, the major employers of the rural labour force will continue to be the primary industries.

Rural farm areas are characterized by a lower per capita income than exists in urban areas.

Chapter 5 - Data

This section provides a capsule view of the procedures which were followed in carrying out the study. Definitions of terms and a flow graph for the questionnaire are discussed.

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* Cohn, Joha, (1973), "Communicating with the Man on the Move", Communications Technology and Social Policy.

** Zimmerman, Carle C. and Moneo, Garry W., (1971), The Prairie Community System.

Chapter 6 - Distribution of Users

Table 4 reveals that private radio systems are between 2 and 17 times more likely to exist in urban environments (per capita) than in rural. Table 9 shows a similar rural/urban use pattern for GLMRS. Table 13 refutes this usage pattern for GRS since it indicates that the penetration of GRS in rural areas is between 50% and 100% greater than that in urban! Excellent maps showing numerous variables such as number of mobiles per unit area in each census division are presented in this chapter for each of the three major mobile services. Tabular data showing the primary usage, by industrial division, are also given. Spatial distribution of licensees are presented in map form.

Distinguishing characteristics of GRS, over and above its popularity with the general population, centre around the lack of constraints associated with its use...

Chapter 7 - Radio Utilization

The indications are that GRS has an appeal to the agriculturally based rural population which is not exhibited by either Private or GLMRS communications. Both Private and GLMRS are primarily urban oriented and have a higher urban penetration than rural. The question is begged off as to whether urban areas possess activities which have a greater requirement for mobile communications or whether these areas possess a more prodigious stock of entrepreneurs who have readily recognized the benefits of mobile communications. Significantly higher penetration of mobile communications exists in areas containing an unusual concentration of economic activity or in which there is a much greater adoption of mobile communications by activities other than the conventional ones. It is this second theme which will be the source of much of the future growth in mobile communications...

Perhaps the most significant factor inhibiting the adoption of mobile communications in rural areas is the cost factor. Mobile communications advantages are not readily measured in dollars and cents but the cost of the service certainly is measurable. Therefore, the decision to adopt mobile communications is, in many respects, dependent upon the ability of individuals to act as entrepreneurs to be able to recognize the possible benefits and to assume the risk that they will be realized.

The tremendous growth of GRS communications, especially in the rural areas, presages the likely turning to and trying out of other forms of mobile communications with the probable commensurate outcome being dissatisfaction with the alternatives...maybe some other system would be more satisfactory...

Chapter 8 - User Characteristics

75% of GRS users stated business as their primary purpose for operating the set. 50% had agricultural needs and transportation and communication needs comprised the additional 25%. The private mobile responses followed a similar pattern. GLMRS was markedly different as construction and mines and

oils were the dominant user groups, followed by transportation and agriculture. RCCMRS was oriented towards transportation and construction and paging was designated most often under the personal service category, no doubt reflecting its application by medical personnel.

The author presents many bar graphs in this chapter that reveal patterns of use, age of licensee, years that the set has been owned, servicing needs, etc. This data pertains primarily to the characteristics of the radio users.

Chapter 9 - Radio Uses

This chapter deals with the actual uses of the systems. For example, it was found that GRS, private mobile licensees, GLMRS, and RCCMRS users all ranked mobile originated calls as being of greater significance than base station origination. The chatty nature of GRS is revealed through bar graph plots of call duration while the business nature of GLMRS, RCCMRS and private mobiles is confirmed by a much briefer average call length. Deeper analysis revealed that those owning multiple GRS sets had considerably shorter duration calls than those with one set - substantiating the dual business/socialization orientations of GRS users, with the multiple set owner having greater business usage.

The average number of calls per working day (13 GRS, 28.8 private, 7.4 GLMRS, 24.6 RCCMRS and 17.2 paging) and substantial decrease primarily for private and RCCMRS on non-working days supports the belief that private and RCCMRS users are business oriented.

Chapter 10 - Evaluation of Systems

Here we are concerned with the reasons why people are satisfied with mobile communications. GRS and private users listed in decreasing order: realization of time and money savings, the separation of work areas and the ability to contact personnel and vehicles. GLMRS users differed by choosing the lack of other communications facilities as their first choice.

The majority of GRS and paging users listed their sets as being of considerable importance; GLMRS, RCCMRS and Private Radio users stated a preference for saying that their sets were absolutely necessary. All five groups of users considered their frequency of use to be increasing. The GRS category expressed considerable dissatisfaction with the range capability of their sets.

Alberta GLMRS users reported congestion delays. GRS reception was reportedly hampered by interference and by lack of privacy. The last section of this chapter presents an interesting perspective on the factors that lead to dissatisfaction with each of the three major modes of mobile communications.

Chapter 11 - Possible Improvements

System improvements and factors inhibiting their introduction are discussed in this chapter.

GRS users recommended a better area coverage and higher quality equipment. Some 8% of GRS users stated that they planned to adopt either Private radio or GLMRS within the next five years...generalizing this to the entire 17,000 rural prairie GRS system population and noting that 75% of these stated a preference for a private system leads us to conclude that some 1020 private systems will appear over the next five years...practically as many as exist in the area now! ...This prediction could easily be on the low side since it ignores the undecided segment (46%) of GRS users and the future growth in GRS licensees.

Attitudes of GRS licensees were interestingly more negative (67%) than positive with some 34% expressing strong, harsh opinions about the service. The well-known very vocal attribute of GRS users is evident from the great number of comments expressed - which we (DOC) should attach considerable importance to since they are the opinions of the end users of this service - concerned individuals who normally are neither asked for nor have the opportunity to give their opinions. A large portion of Appendix E of the main report is devoted to these opinions.

Private licensees considered better area coverage as the most desirable objective. Lower cost and connection to the telephone system were also listed frequently. Comments received indicated that a significant number of users had previously been GRS licensees and had found it inadequate for their needs.

GLMRS users wanted better area coverage and secondarily expressed a desire for less congestion and low cost equipment. 28% of the users foresaw alterations within the next five years, mostly of an equipment nature and 43% of the comments contained negative opinions.

The attitudes and comments of the 42 RCCMRS licensees were similar to those of the GLMRS group with the major exception being that their comments were generally positive.

Even the paging group considered better area coverage as their first concern!

Chapter 12 - Socioeconomic Effects

The relationships between attributes of mobile radio use and socioeconomic characteristics of the population are treated in this chapter. A sampling of the results is as follows:

- large systems are associated with large farms.
- larger populations of young farm operators have larger systems.

Generally, the average number of GRS mobiles is seen to increase with characteristcs associated with rural environments while the average number of calls vary with characteristics associated with urban environments. The percentage of calls for business purposes had a negative correlation with the population indicating a rural/business link for GRS. One correlation that has interesting longer-term implications is that owners with higher income levels were less satisfied

with GRS.

Studies on both Private and GLMRS licensee relationships between use and socio-economic factors did not reveal any unexpected results.

Chapter 13 - Pilot Study

The personal interviews conducted in the Quill Lake area to provide additional input data for this study yielded information that should be regarded as an overview of mobile communications for this particular rural area.

Three general conclusions apply to the private radio licensees; namely they present a progressive image, they adopted their systems because of a personal contact and finally the privacy attribute of this type of system is very attractive.

Most of the GRS users were farmers and there was some evidence of a series of GRS communities involving closely-grouped farmers in the area. The usefulness of GRS communications for small family farms - a farmer and his wife - was frequently noted. GRS was also noted for its role in social communications.

Although all the farm operators surveyed were on party lines, lack of privacy was not a major dissatisfaction. The major problem was the inability to communicate when desired and a secondary complaint was with the reliability of the system. One farmer who had a private radio system noted that it was inconsistent to have reliable communications to his base when it was not possible to rely upon the telephone system beyond that point. The observations mentioned in this paragraph were obtained from a small sample of households (about 60) in a geographically small area (Quill Lake). The results may not be representative of other areas.

Chapter 14 - Conclusions

Perhaps the most obvious, and illuminating, results pertain to the status of GRS communications. It has been demonstrated that this communications technique stand up quite well when scrutinized from a 'business radio' point of view. Admittedly, there are elements within the service category which are non-business. But the indications are that these elements are concentrated in urban places. There is also an indication of friction between business and non-business users. The popularity of GRS communications in rural areas is unquestionable and it is tempting to conclude that the major reason for this popularity is the lower cost factor. Nevertheless, the recent growth of GRS has resulted in a greater number of mobile radio users than ever before.

The status of private radio systems in rural areas is not on the same level as that of GRS. The attraction of this type of communications system is greatest for services typically associated with farm cities and for the higher income farm population. The higher cost of this communications technique demands that greater benefits be realized.

Radio-telephone communications in rural areas has been shown to be concentrated in Alberta. But, like private radio communications, this service presents an urban orientation. The higher cost of this service is also seen to hamper its popularity.

Users in all three of the major service categories have demonstrated a desire for better area coverage. This may be the key element upon which future improvements should be concentrated. Generally, all rural residents are within forty miles of a farm city. In addition, agricultural units do not typically have contiguous parts but may be spread out over thirty miles or more. The ultimate communications system would be able to provide communications both within the sphere of operations and from that sphere to the service center locations.

Never before has mobile communications been within the reach of so many rural residents. The popularity of GRS at present is sure to reflect upon the alternative communications techniques in the future. The friction between responsible and non-responsible users will promote the adoption of these other services. But it is also possible that many users will be forced, from an economic viewpoint, to continue using this service even though it is not considered to be optimal.

The Tables and Figures on the following pages are typical of the results presented in the original report.

TABLE 4

CLASSIFICATION OF PRIVATE RADIO SYSTEMS AND LABOUR FORCE PENETRATION
BY POPULATION CLASSIFICATIONS

	No. of Systems	No. of Mobiles	Average System Size	No. in Work Force 1971	Mobiles/1000 Work Force
Province of Alberta	2,306	17,763	7.7	756,665	23.6
Centres over 100,000	1,250	12,165	9.7	416,585	29.2
Centres 10,000-99,999	334	2,090	6.3	57,155	36.6
Centres 5,000- 9,999	89	435	4.9	20,870	20.8
Centres under 5,000	433	2,560	5.9	72,865	35.1
Rural	200	413	2.1	189,195	2.2
Province of Saskatchewan	826	3,001	3.6	410,070	7.3
Centres over 100,000	378	1,440	3.8	125.190	11.5
Centres 10,000- 99,999	110	378	3.4	46,680	8.1
Centres 5,000- 9,999	37	243	6.6	12,200	19.9
Centres under 5,000	114	377	3.3	37,500	10.1
Rural	187	563	3.0	188,490	3.0
Province of Manitoba	1,009	5,424	5.4	458,920	11.8
Centres over 100,000	452	3,188	7.1	263,035	12.1
Centres 10,000- 99,999	97	442	4.6	33,715	13.1
Centres 5,000- 9,999	41	181	4.5	12,865	14.1
Centres under 5,000	178	751	4.2	24,615	30.5
Rural	241	834	3.5	124,685	6.7
	4,141	26,188	6.3	1,625,655	16.2

TABLE 9

CLASSIFICATION OF GENERAL LAND MOBILES AND LABOUR FORCE PENETRATION
BY POPULATION CLASSIFICATIONS

	No. of Systems	No. of Mobiles	Average System Size	No. in Work Force 1971	Mobiles/1000 Work Force
Province of Alberta	4,655	8,415	1.8	756,665	11.1
Centres over 100,000	2,348	4,894	2.1	416,585	11.7
Centres 10,000-99,999	553	895	1.6	57,155	15.6
Centres 5,000- 9,999	214	347	1.6	20,870	16.6
Centres under 5,000	1,021	1,642	1.6	72,865	22.5
Rural	519	637	1.2	189,195	3.4
Province of Saskatchewan	552	676	1.2	410,070	1.6
Centres over 100,000	225	286	1.3	125,190	2.3
Centres 10,000- 99,999	86	100	1.2	46,680	2.1
Centres 5,000- 9,999	25	43	1.7	12,200	3.5
Centres under 5,000	113	134	1.2	37,500	3.6
Rural	103	113	1.1	188,490	0.6
Province of Manitoba	383	414	1.1	458,920	0.9
Centres over 100,000	282	302	1.1	263,035	1.1
Centres 10,000- 99,999	23	24	1.0	33,715	0.7
Centres 5,000- 9,999	12	13	1.1	12,865	1.0
Centres under 5,000	26	31	1.2	24,615	1.3
Rural	40	44	1.1	124,865	0.4
TOTAL	5,590	9,505	1.7	1,625,655	5.8

TABLE 13

GRS PENETRATION INTO THE PRAIRIE PROVINCES
NOVEMBER 1976

	Total No. of GRS Units	Estimated Penetration No. of Units/1000 Population		
		Total	Urban	Rural
Alberta	40,483	24.9	20.8	31.9
Saskatchewan	31,491	34.0	24.2	41.5
Manitoba	16,369	16.6	12.2	24.3

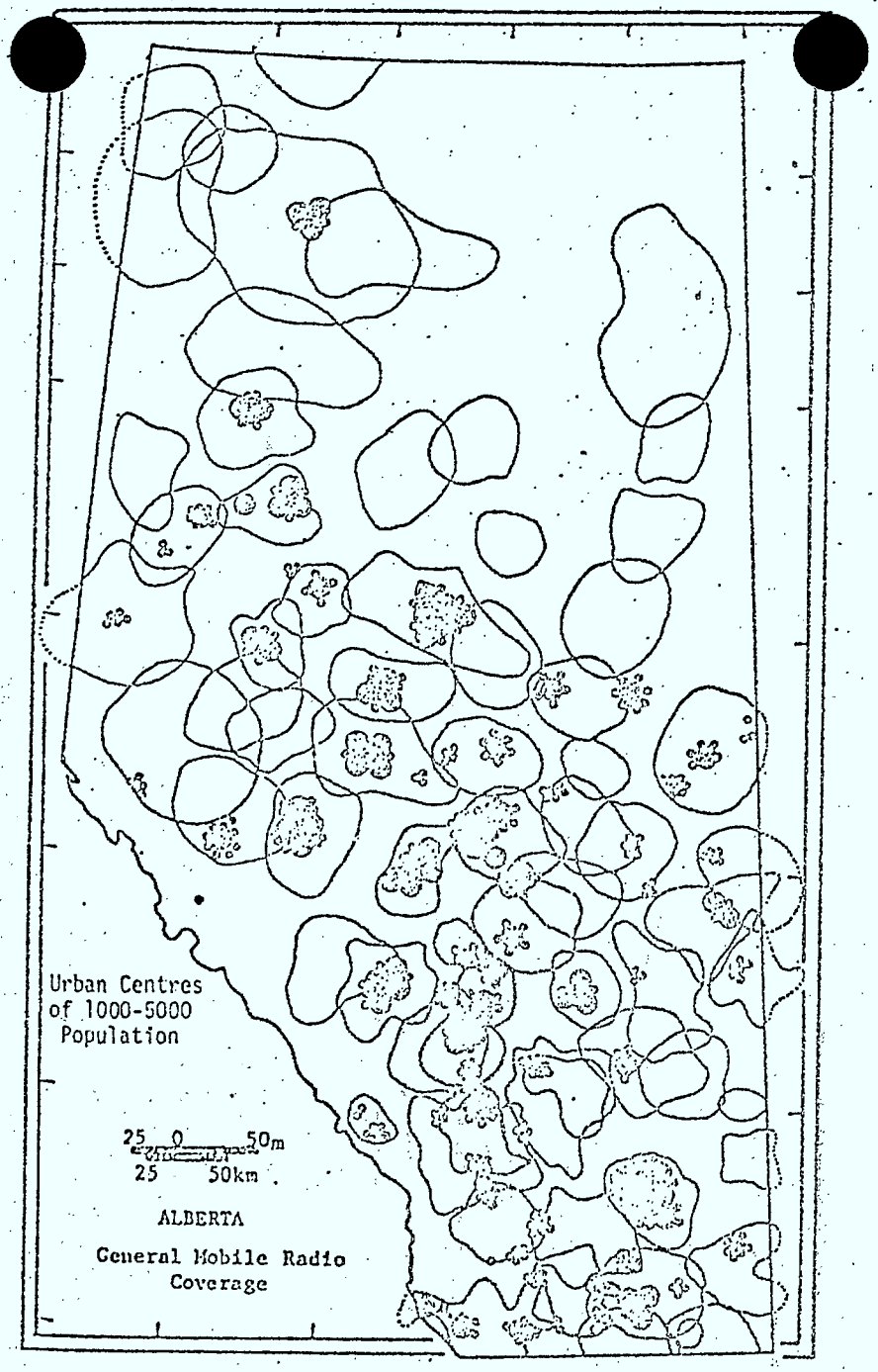

FIGURE 52 DISTRIBUTION OF GLMRS USERS

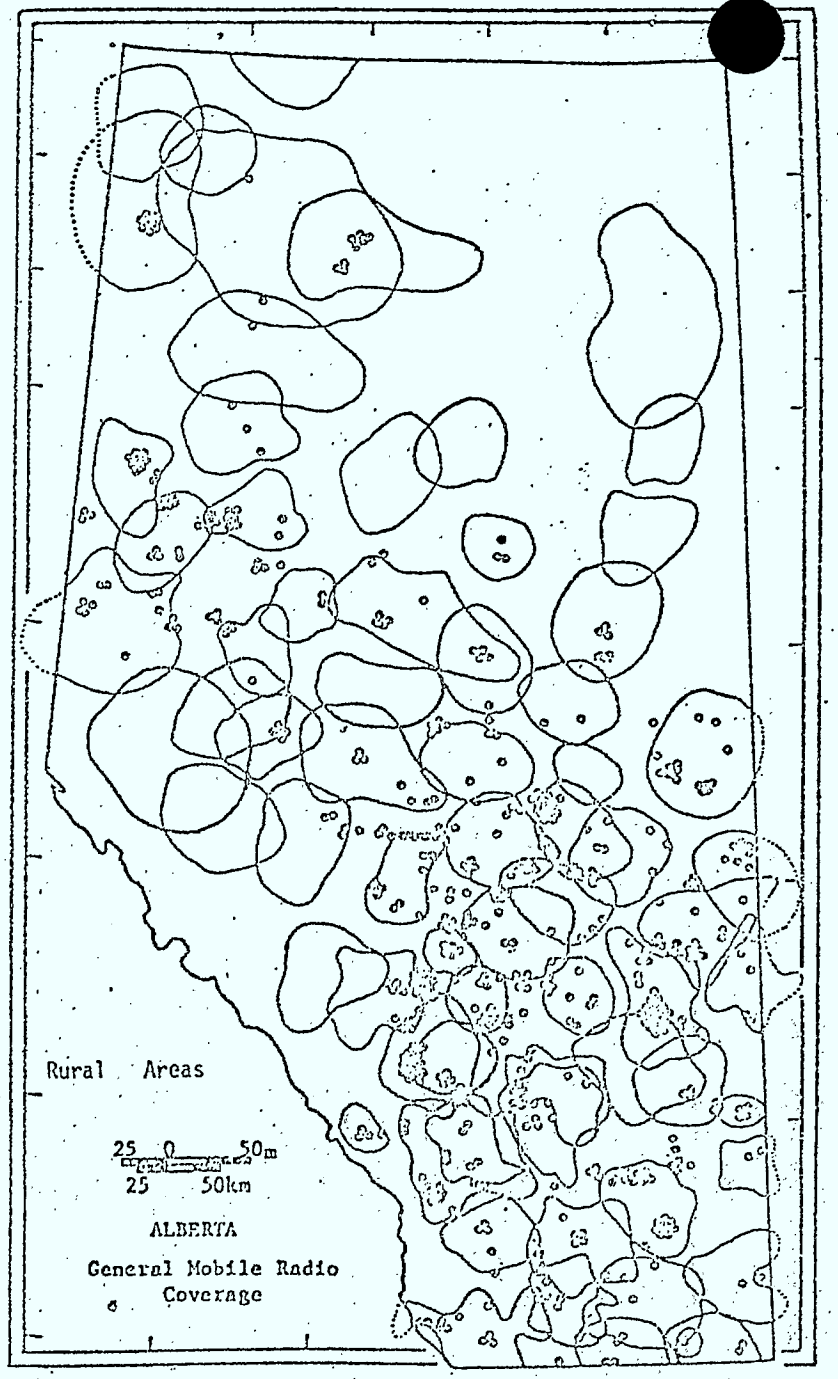

FIGURE 53 DISTRIBUTION OF GLMRS USERS

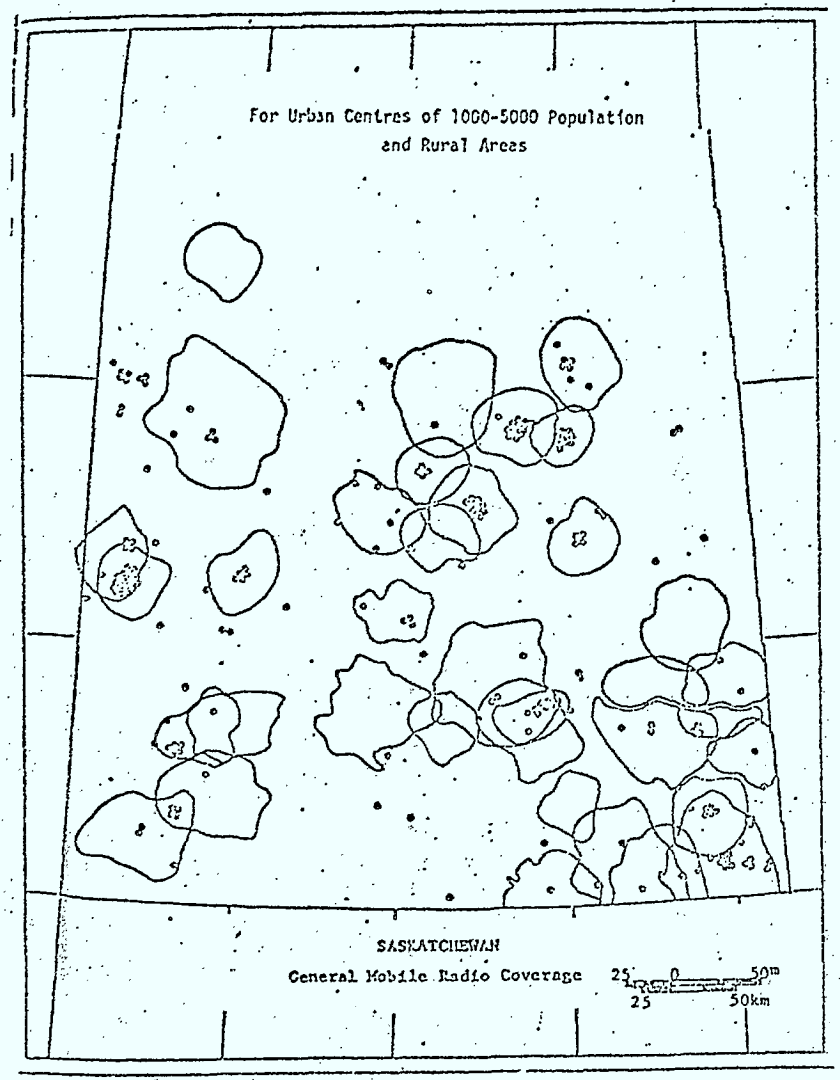

FIGURE 54 DISTRIBUTION OF GLMRS USERS

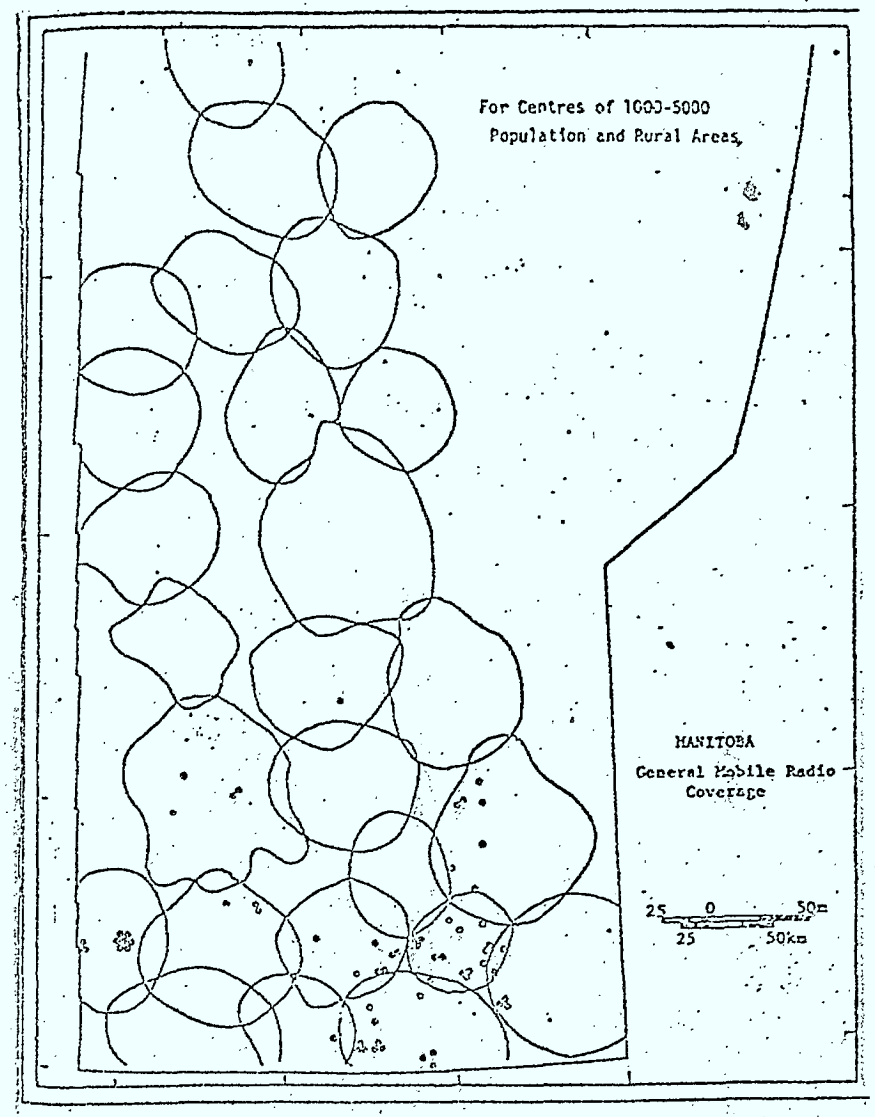

FIGURE 55 DISTRIBUTION OF GLMRS USERS

- 1 system
- 6 systems
- 10 systems

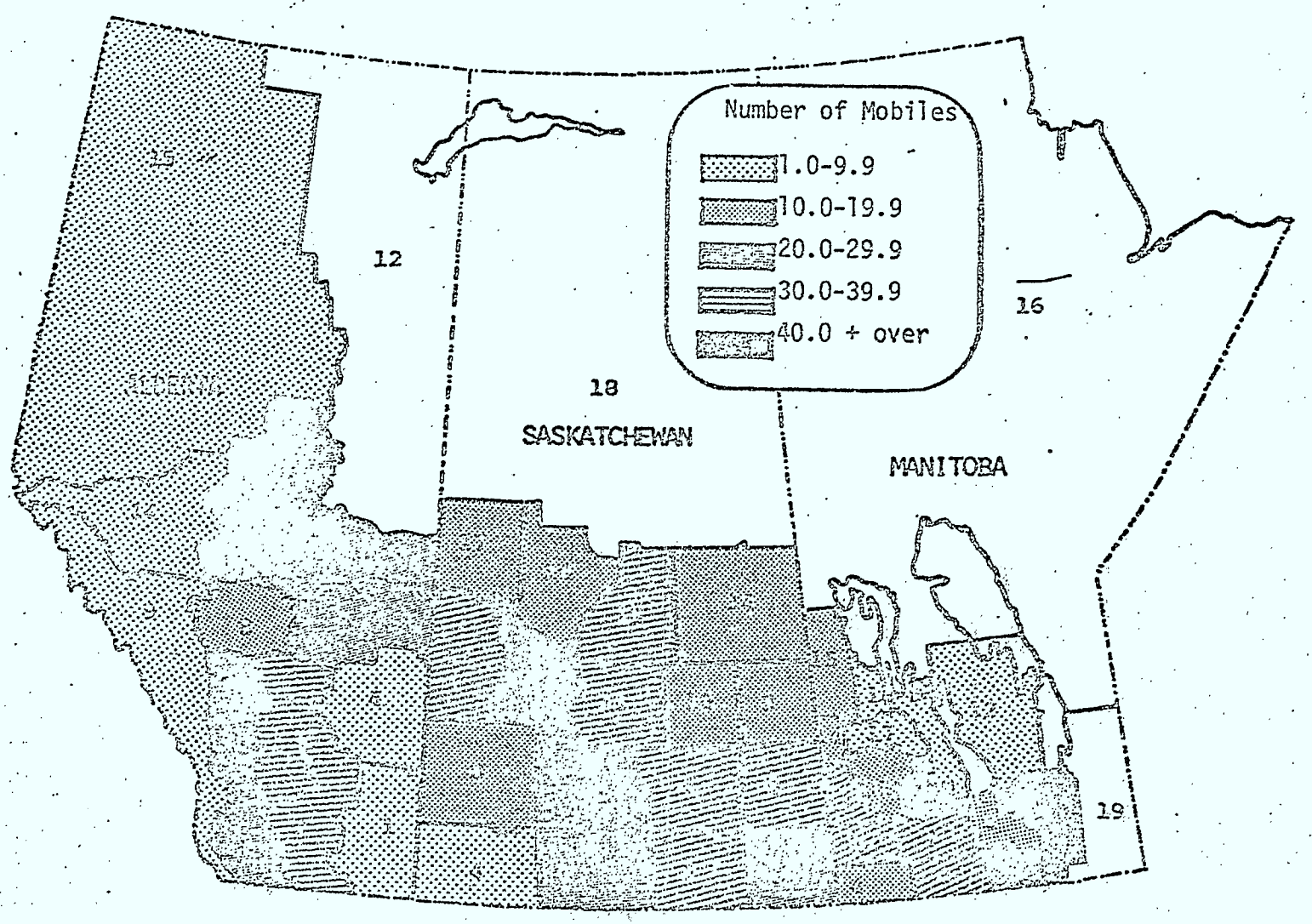

FIGURE 60 ESTIMATED NUMBER OF GENERAL RADIO SERVICE MOBILES PER TEN SQUARE MILES, EXCLUDING MOBILES LOCATED IN URBAN CENTERS EXCEEDING 5000 POPULATION, BY CENSUS DIVISIONS

TABLE 11

CLASSIFICATION OF GENERAL MOBILE RADIO SYSTEMS
BY FIELD OFFICE LOCATION AND INDUSTRIAL DIVISIONS
(Licensees from Urban Centers over 5000 are excluded)

	Agriculture	Forestry	Fishing, Trapping	Mines, Quarries, Oil Wells	Manufacturing	Construction	Transportation	Trade	Finance, Insurance, Real Estate	Community, Business, Personal Service	Other	TOTALS
Edmonton	23	14		106	21	196	145	77	16	169	3	770
[illegible]ry	55	3		58	20	92	124	48	7	95	4	406
Grande Prairie	12	14	1	45	10	79	87	21	2	67	26	364
Regina	28			7	1	26	5	7		21	2	97
Saskatoon	22	1		13	3	31	7	11	5	26		119
Winnipeg	5		1		3	26	6	4	4	13	2	64
Thompson							2					2
Fort Smith					2	3	7	1		5		18
Yellowknife			1	1	1	10	7	2		5		27
TOTALS	145	32	3	230	61	463	390	171	34	401	37	1967

FIGURE 65. DISTRIBUTION OF USERS BY INDUSTRIAL CLASSIFICATIONS AND NUMBER OF MOBILE UNITS FOR MAJOR SERVICE CATEGORIES

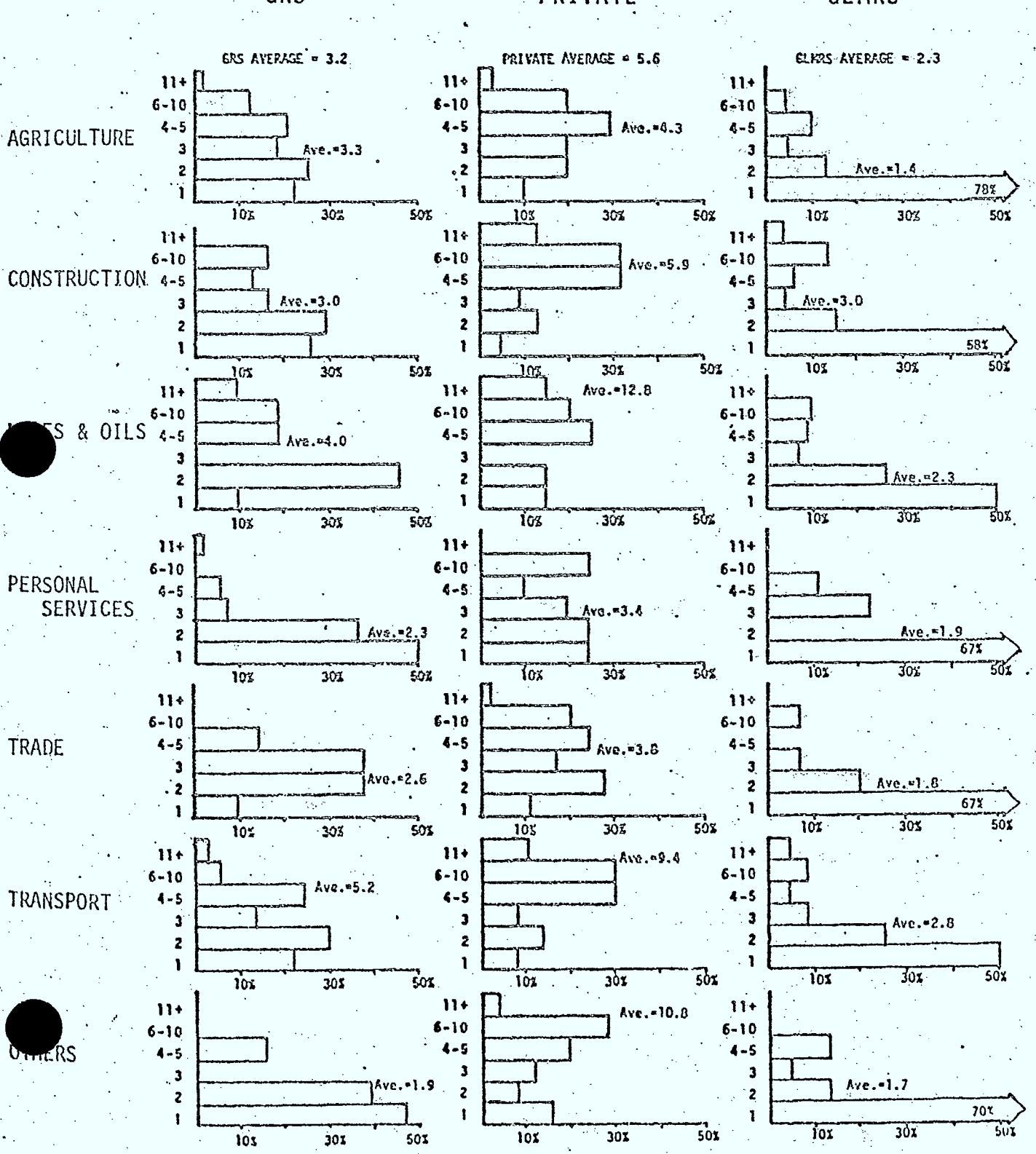

FIGURE 68

CLASSIFICATION OF USERS BY DURATION OF CALLS AND SERVICE CATEGORY