R-76-111

LAW ENFORCEMENT ASSISTANCE ADMINISTRATION
POLICE TECHNICAL ASSISTANCE REPORT

SUBJECT: Vermont, Communication Equipment Specifications and Requirements Analysis

REPORT NUMBER: 75-122

FOR: Vermont Governor's Commission on the Administration of Justice
Vermont Population: 447,000
State Area: 9,609 square miles

CONTRACTOR: Westinghouse Justice Institute

CONSULTANT: A. Robert Patzlaff

CONTRACT NUMBER: J-LEAA-003-76

DATE: March 1, 1976

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FOREWORD

As a first step in the purchase of mobile and portable radio equipments for law enforcement agencies throughout the State, the Vermont Governor's Commission on the Administration of Justice (State Planning Agency) requested technical assistance in the review of specifications being prepared for this procurement.

Requesting Agency/ State Planning Agency:	Vermont Governor's Commission on the Administration of Justice, Mr. Forrest Forsythe
Approving Agency:	LEAA Region I Office (Boston), Mr. John Keely, Police Specialist

1. INTRODUCTION

Police departments in the State of Vermont have requested funds for purchasing mobile and portable radio equipments which can be used to expand the usage of their recently installed ultra-high frequency (UHF) radio communications network. Contracts covering additional equipment purchases expired in the Spring of 1975. The Vermont Governor's Commission on the Administration of Justice is desirous to obtain a contract for a large quantity of radios which can be used by the various departments. It was felt that it would be far more economical to purchase in this way rather than for each department to purchase radios piecemeal and in small quantities. The intended purchase contract would allow units to be delivered over a period of several years at a contract price agreed to with this procurement.

As a first step in this process, the Commission requested of the LEAA office in Boston technical assistance to review specifications being prepared for this procurement. This review was to ensure that the specifications would be so written so as to encourage competitive bidding by several manufacturers of the highest quality equipment available while ensuring compatibility with the existing system.

The State of Vermont has an area of 9,609 square miles and a population of 444,732 (1970 census). Law enforcement activities of 51 towns and county departments, plus the Vermont State Police, work cooperatively in this radio communications network and share many of the radio repeater facilities. Use of multi-frequency radios provides communications amongst the various agencies. Law enforcement departments affected by this system involve a combined manpower force of from 700 to 735 fulltime sworn officers.

Draft copies of tentative specifications were made available to the Consultant prior to the field visits of January 14 and 15. These draft specifications were the result of reviewing manufacturers' catalog pages and the specification standards for personal/portable frequency modulation (FM) transmitters and mobile transmitters issued by the National Institute of Law Enforcement and Criminal Justice.

The draft specifications were based on the assumption that mobile units would be all-solid-state, with power output of 90 to 100 watts and capable of eight-channel operation. Portable specifications were based upon a requirement for all-solid-state, 4-watt minimum power output, and four-channel operation. Equipments exhibiting modular type construction were thought to be most desirable because of the simpler servicing techniques they afford. Particularly with smaller portable radio units, modular construction greatly speeds the time (and, therefore, lowers the cost) of repair and was thought to be an advantage in any new equipment.

The Consultant consolidated the various specifications and made certain changes that were typed and assembled in the LEAA office in Boston on January 14. On January 15, representatives from the interested agencies met in Montpelier, Vermont, at the Vermont Justice Commission Office. Attendants at this meeting were as follows: Mr. John Keely, Police Specialist, LEAA, Boston, Massachusetts; Mr. Mike Sheehan, State Representative for Vermont, LEAA, Boston, Massachusetts; Mr. Irving McAndrews, Public Safety Communication Office, State of Vermont; Mr. Tom Davis, Public Safety Communication Officer, State of Vermont; Mr. Forrest Forsythe, Director, Justice Commission, Vermont; Mr. Bob D'Ordio, Justice Commission, Vermont; Mr. John Gladding, Vermont League of Cities and Towns (VLCT); and Mr. Bill Kolezar, Chief of Police, Montpelier, and representing police chiefs of the state.

2. UNDERSTANDING OF THE PROBLEM

To encourage prospective manufacturers to offer equipments at an attractive price over a long-term period, several factors must be considered:

- A sufficient quantity must be purchased to make it worthwhile for the manufacturers to give a discounted price.
- Several manufacturers should be able to bid equipments, while unique operational functions not required should be avoided.
- The equipment required should be generally of a standard production nature and not require special modifications that could increase the price and delivery times.
- The selection of the successful equipment bidder should be able to be made solely on the price bid for equipment meeting the specifications without any obligation to accept services or other equipments as a condition for purchase.
- The purchaser should retain the right to purchase a split award (i.e., purchase portables from one manufacturer and mobiles from another), if it is to his advantage.

These conditions would tend to encourage a truly competitive bidding situation. The following paragraphs touch on areas of discussion that were brought up at the meeting on January 16 and that would have a bearing on the procurement.

2.1 100-Watt Power Output

If the specification is written around 90- or 100-watt, all-solid-state, mobile radio equipments, only two manufacturers can bid this equipment. This is not to say that other manufacturers may not have a product in their development laboratories that could be bid at that time. However, based on known product available ability, the bid would be restricted to two manufacturers. There are no operational data to support technically the need for 100-watt mobile radios. Only vague opinion was expressed that it was needed. The Consultant pointed the difference between a 50-watt and a 100-watt mobile unit. The 100-watt unit would only offer approximately 1.4 times the amount of received signal in microvolts. Further-

more, it was pointed out that, if there are places where a 50-watt mobile unit cannot now talk into a station and a 100-watt mobile unit can just barely be heard, the system has problems far greater in magnitude than the differences between a 50-watt and a 100-watt mobile unit. The system margins are far too thin for reliable police communications, and other factors should be investigated, such as additional base stations or remote receivers for substantially improving the coverage. Time did not permit a thorough analysis of the entire system to determine where this might apply. However, to make the entire procurement for 100-watt mobile units both increases the price and is wasteful of battery power where such units are not needed. Furthermore, it appeared the proposed use of 100 watts was made for a communications that was occasionally desirable rather than required on a day-to-day basis. It is recognized that the terrain is mountainous and that every additional system gain should, of course, be incorporated to provide the best communications. However, this Consultant can only reach the conclusions that a 3-dB margin for mandatory communications is far too slim and that, if the problem is in fact one of reaching stations that can only be reached by a 100-watt mobile unit (vis-a-vis a 50-watt), other system modifications should be made to ensure system margins of at least 15 dB, wherever possible.

An alternative would be to request bids for both 50- and 100-watt units, with the final determination for procurement being made after bids are in and a more thoroughly quantitative analysis can be made.

2.2 Number of Channels

A previous technical assistance report* concerning this system described the following channel concept:

- Channel 1 -- Mobile to dispatcher, normal communications, either directly or through a repeater station.
- Channel 2 -- Statewide frequency for short-range, car-to-car communications (simplex).
- Channel 3 -- Access through a statewide repeater network, using special tone encoders.
- Channel 4 -- Statewide data system access.

The report also indicated that changes in this frequency plan were already occurring to accommodate system problems of range and other

*Westinghouse Police Technical Assistance Report R-74-138, Operational Evaluation, Vermont Statewide Law Enforcement Radio Communication System, June 1974, pp 3-1,3-2.

communications difficulties. A review of the Federal Communications Commission (FCC) license data shows that there are 17 different radio channels used in the 460/465 channel allocations for this system. Further review shows that many of the cities are already licensed for more than four-channel operation. This suggests that perhaps the basic frequency plan has not been observed and had to be abandoned to correct certain local problems. Continuance of a policy to correct problems by frequency addition would dictate a need for radios having a larger channel capacity than the 4 specified for portables. During discussion of the current procurement specifications, it was therefore concluded that portables should be capable of expansion to six channels and mobile to eight channels. However, for pricing purposes, it was recommended that all bidders include frequency-determining devices for four channels in both the mobile and the portable radio. It was recommended that channel expansion be possible through the addition of frequency-determining elements only.

It is recommended that a very careful review of the system frequency plan be conducted. As noted, Channel 4 is reserved for a future data communications channel. It is intended that eventually printed information be sent over this channel. At such time as that modification is made to the system, it may be necessary to add a separate receiver in the vehicles to accommodate the printed messages. If printed messages are received on a receiver with the scanning capability there could be excessive disruption in normal voice communications. Setting the receiver priority could be a challenge to the operator. If set for priority on the data, voice dispatches could be missed, and if set for priority on the voice channel, areawide printed messages could be missed. The cost of this expenditure for additional receiving equipments should not be overlooked in the future planning.

To further simplify system operation, attention should be given to finalizing combined dispatch locations so that several towns could be dispatched from a centralized point. It is felt that this practice could cut down on the number of channels used and simplify the system. The channel plan could possibly be modified as follows:

- Channel 1 -- Local dispatch, base-to-mobile, mobile-to-base, 2-frequency simplex or repeat.
- Channel 2 -- Direct car-to-car on the base talk-out frequency for the area.
- Channel 3 -- Access to statewide repeater network.
- Channel 4 -- Common statewide car-to-car channel.

In pursuit of this alternative, efforts could be made to make each dispatch district self-sufficient for coverage on its local dispatch channel, thereby avoiding much of the channel usage now at present. For reference, a list of channel usage in the system is presented in Table 2-1. The revised channel plan suggested does not eliminate the information channel; rather, information would be requested on the local dispatch channel and transmitted on a data channel to receivers in the vehicle. If preferred, Channel 5 could be reserved for transmission to a data center, but printed message reception should be made through the use of a separate receiver in the vehicle.

2.3 Push-Button Transmitter Frequency Selection

This feature is probably a special-order option with most manufacturers and could result in increased price and more importantly extended delivery time for each individual procurement. While a large quantity of radios purchased at a single time could easily have this special feature incorporated, manufacturers would probably be reluctant to provide this feature with mobile deliveries spread out over a period of several years. Thus, insistance upon inclusion of this feature may well involve contract negotiations and delays which would not be acceptable to the State of Vermont procurement agency.

2.4 Warranty and Service

It is recommended that the specifications require each manufacturer to spell out clearly what his warrantly provisions are for the equipment bid and exactly how advantage of the warranty provisions are to be implemented. In other words, the equipment bidder should tell what procedures should be followed when equipment fails under the warranty period. The warranty is not to be confused with a larger question of continued routine maintenance after the warranty period. A maintenance agreement or arrangement can be established completely separately and independent of the equipment supplier. Equipment failing under warranty would still be the responsibility of the equipment manufacturer. It is recommended that a separate request be made for routine maintenance service for the equipment and that the alternative of using State facilities for maintaining this equipment also be explored. This would remove a large deterrent to free choice of equipment suppliers now facing the State. Further discussion of this point is presented in Section 3.

TABLE 2-1

Radio Channel Usage Vermont Police Network

460/465 MHz Channel Suffix	Number of Vermont Departments Licensed on Channel	State Police Licensed
.025	49	X
.050	6	
.075	1	
.100	3	
.125	3	
.150	34	
.175	19	
.200	10	
.225	2	X
.250	13	
.275	6	X
.300	3	
.325	1	X
.350	0	
.375	5	X
.400	0	
.425	5	X
.450	6	
.475	1	X
.500	49	X

SOURCE: Action Radio Microfiche For November 1975

MOBILES AUTHORIZED: 51 Towns, 466; State Police 400

3. ANALYSIS OF PROBLEM AREAS

3.1 Service -- Continuing Maintenance Program

It is recommended that the State of Vermont provide for service to its radio equipment that is independent of the equipment suppliers. That is, a service organization that will service any equipment the State may happen to purchase is a desirable goal to pursue. More cohesiveness and better coordination of the system can be achieved if the service for the entire system is negotiated from the State planning organization. This would be looked on more favorably by the prospective suppliers of this service since they would have to deal with only one organization on a single contract. Thus, a more favorable price might be possible through this arrangement. Furthermore, it would ensure the quantity of service needed for negotiating a statewide contract. Any recommendations herein are certainly not intended to exclude any manufacturer of radio equipment from providing services, but any contract so offered should have provision for servicing equipment of any manufacturer which the State of Vermont may use in its system. Two alternatives seem possible.

- Alternative A would be for the State to have a statewide contract for complete maintenance of mobile and portable equipments in the 51 departments.

- Alternative B would give consideration for increasing the facilities in the State Police Radio Maintenance Department for providing service to the towns and distributing the cost among the towns.

To provide some quantitative basis for evaluation, companies offering nationwide service were contacted to find the estimated prevailing rate for such service. Two types of service are offered. One offers service during the normal working hours on weekdays, the other service offers 24-hour service. Service may be performed either at the service station shop or at the field location of the customer. The range of service per radio unit per month varies from a minimum of $6.00 to $11.50 for portable radio units and from $7.00 to $12.00 for mobile units of the type being considered by the State of Vermont. Based on an estimated total number of 255 portable radios being ultimately used by the 51 town departments, the minimum monthly cost for service would be $1,530 and the maximum estimated at $2,933. Mobile service would range from a minimum-effort service cost of $1,785 to the most deluxe service of $3,060. Addition of these costs gives an annual cost range of service, depending upon the requirements, of $39,780 to $71,916. If one were to average the cost on the assumption that some departments could bring mobiles to the company shop and others would demand field service, an approximate average annual

service cost of mobiles and portables would be $55,848. Base stations, control and consoles, and other auxiliary equipment would also require maintenance; if 51 sites at $60 per month are assumed, this would add $36,720 to the annual maintenance cost. Thus, it is thought that a maintenance contract for all portables, mobiles, and base stations could be negotiated for in the neighborhood of $90,000 to $100,000 per year. This cost could be prorated among the various towns using the service in proportion to the numbers of equipments they operate.

When the alternative of the State's providing service is considered, the costs can be estimated as follows:

- Capital equipment needed to provide the initial service capability:

- Truck	$ 5,000.00
- Test Equipment	10,000.00
- Spare Units	10,000.00
- Total	$25,000.00

- Annual Service Cost

- 7-year Depreciation of Capital Equipment	$ 3,570.00
- Parts (Estimate - 30% of the unit's cost $50 each)	13,650.00
- Mobile Service Vehicle Operating Cost (15,000 miles @ 15¢ a mile)	2,250.00
- Service Technican Salary	15,000.00
- Total Annual Cost Estimate (State-provided)	$34,470.00

The above tabulation would be for one additional service truck. The State already has many of the basic communications services established and already maintains a repeater network in the State. Prorated among the 51 towns, the estimated additional annual expenditure of $35,000 would cost each town approximately $686 a year, or $57 a month. These, of course, are estimates but do show that there is an apparent advantage in the State taking over this maintenance service. Not only does the cost appear less, but there would be State control over the entire operation. Even if two vehicles were provided, the cost of $69,000 would be less than the estimated $100,000 for a contract with an outside firm.

It is recommended that the State write a request for bids from service organizations that will provide service 24 hours a day, 7 days a week, at the customer location for all portable and mobile equipments. Base station equipments used by the towns and not common to the State system should also be covered by the service agreement. By writing the requirements in this way, there is no need for the State to specify exactly where the service agency will provide its shop facilities. The only contractual requirement that they must meet is to provide the service within the time specified. It should be specified that all service complaints be corrected within 24 hours after reporting the difficulty.

3.2 Frequency and Channel Usage

Table 2-1 in Section 2 shows the usage of the 17 channels in the system. The State of Vermont uses all but three of the available radio channels in the 460/465 channel pairing plan. Based upon the small number of mobile units in each of the various towns, this license information shows the average number of mobiles licensed per town to be about ten. If one considers that half of these are probably portable units, that leaves approximately five units being dispatched from the towns.

Appendix A contains a tabulation of the frequencies listed in the FCC records obtained from the Action Radio Company in microfiche form. This is provided as a convenient means for the State to check the correctness of its licenses and as a convenient guide as to frequency usage for further planning. One discrepancy that was noted throughout these listings was that the frequency 465.025 was consistently listed as a mobile relay transmitter. This is a mobile only/control type frequency and it is suspected that this is either listed in error in these listings, or there may be some incorrect frequency listings on station licenses. The State personnel responsible for licensing may want to review this point.

It is recommended that the SPA initiate a thorough analysis of frequency usage throughout the State with a view towards consolidating the dispatch operations of some towns. The plan should ensure solid communications coverage for the area dispatched. The objective should be to minimize the total number of frequencies used throughout the State, thereby simplifying the system, cutting down on crystal inventory, and providing better coordination. A channel plan that has the first two channels for the dispatch from the message center and the last two for statewide communication is recommended for consideration. Moreover, printed information should be received on a separate receiver rather than cluttering the scanning receiver with this type of transmission. Eventual implementation of the "911" emergency telephone system should not be overlooked in this planning. Perhaps much of this has already been accomplished in developing the present planning. In this regard, the Consultant recognizes that the planning for the present system has been undertaken to

meet a complex requirement in a very difficult terrain for communications. From the available FCC listings, the problems listed in the WJI report of June 1974, and personal observations during discussions at the January 15, 1976 meeting, it seems to this Consultant that further finalization of a firm frequency plan for future expansion should be considered at this time. This, however, need not slow up or hinder the present procurement since the equipments can function independently of the frequency plan as long as it retains the same range of frequencies presently being used.

4. FINDINGS AND CONCLUSIONS

The following are the principal findings and conclusions:

- Service -- It appears that the State could enjoy a financial advantage and independence from equipment suppliers by providing maintenance to its radio equipment through expansion of the existing State Police facilities, or by obtaining a contract from an independent maintenance service organization.

- Frequency Plan -- A reevaluation of the frequency plan and firm adherence thereto should be initiated. Local dispatch areas should be established with more solid communications coverage within a given area. By establishment of area frequencies, the problem of coverage can be approached from a firmer basis than by trying to accommodate 51 individual towns. The use of satellite receivers and additional stations, where necessary, may have advantages over providing 100-watt mobile units throughout the entire network, since the latter is not a panacea for all of the existing problems.

5. RECOMMENDED COURSE OF ACTION

The following constitutes the recommended course of action:

(a) Evaluate Ultimate Frequency Plan.

- Combined Dispatch/Channel Reduction.
- Data System Clarified.

(b) Determine Quantity Needed.

(c) Issue Specification for Bidding on 50- and 100-Watt Mobiles, 4-Watt Portables.

- Request Suppliers Bid Units Equipped with 4 channels.
- Channels Expanded by Adding Frequency-Determining Elements Only.
- Bidders to Spell Out Warranty Procedure.
- Bidders to List and Price Accessories.
- Split Award Possible.

(d) Prepare Specifications for Service Contract Bids For:

- 24-Hour/7-Day/at Equipment.
- In Service 24 Hours After Notification.
- Will Service Any Manufacturer's Equipment.
- Cover Approximately 50 Towns' Mobile, Base, Portables.

(e) Evaluate Feasibility For State Police To Provide Maintenance.

APPENDIX A

State of Vermont Frequency Listings

LICENSEE (DEPT.)	FREQ.	BASE	MOBILES
Barre, City of	460.150	1	10
" "	460.025	1	10
" "	460.500	1	10
" "	465.025	1 (CONTROL)	
Barre, Township of	460.150	1	1
" "	460.200	1	1
" "	460.425	1	1
" "	460.500	1	1
" "	465.025	1 (MOBILE RELAY)	
Barton, City of	460.150	1	5
" "	460.250	1	5
" "	460.500	1	5
" "	460.300	-	5
" "	460.025	-	5
Bellow Falls, City of	460.400		20
" "	460.150	1	20
" "	460.500	1	20
" "	465.025		20
" "	465.100		20
" "	460.275	1 (BASE)	
Bennington, City of	460.5	1	10
" "	465.025)	1 (CONTROL)	
" "	465.025)		10
Bradford, City of	460.250	1	5
" "	460.300	1	5
" "	465.025	1 (M.R.)	
Brandon, City of	460.050	1	5
" "	460.125	1	5
" "	460.150	1	5
" "	460.500	1	5
" "	465.025	-	5
" "	465.025	1 (M.RELAY)	
Brattlesboro, City of	460.150	1	10
" "	460.200	1	10
" "	460.500	1	10
" "	465.025	1 (CONTROL)	
" "	465.200	1 (M.R.)	
" "	465.025	-	10

LICENSEE (DEPT.)	FREQ.	BASE	MOBILES
Bristol, City of	465.025	1 (M.R.)	
Burlington, City of	460.125	1	20
" "	460.150	1	20
" "	460.500	1	20
" "	465.025	1 (CONTROL)	
" "	465.025	-	20
St. Johnsbury, City of	460.275	1	15
" "	460.450	1	15
" "	460.500	1	15
" "	465.025	1	15
Castleton, City of	460.200	1	5
" "	460.375	1	5
" "	465.025	-	5
" "	460.500	1	5
" "	460.050	3	
" "	460.175	1	
Charlotte, City of	460.150	1	10
" "	460.225	1	10
" "	460.250	1	10
" "	460.500	1	10
" "	465.025	1 (M.R.)	
" "	465.025	0	10
Chester, City of	460.150	1	10
" "	460.175	1	10
" "	460.500	1	10
" "	465.025	0	10
" "	465.025	1 (M.R.)	
Chesterfield, City of	460.025	1	0
" "	460.250	1	0
" "	460.500	1	0
Chittenden, County of	460.450	2	6
" "	460.500	1	0
" "	465.025	1	6
" "	465.450	0	6
Colchester, Town of	460.075	1	10
" "	460.150	1	10
" "	460.175	1	10
" "	460.500	1	10
" "	465.025	0	10

LICENSEE (DEPT.)	FREQ.	BASE	MOBILES
Essex Junction, City of	460.100	1	10
" "	460.150	1	10
" "	460.500	1	10
" "	465.025	1(CONTROL)	
" "	465.025	0	10
Fair Haven, City of	460.200	1	5
" "	460.375	1	5
" "	460.500	1	5
" "	465.025	0	5
" "	460.175	1	10
" "	465.175	0	16
Hardwick, City of	465.025	1(M.R.)	5
" "	460.300	1	3
" "	460.500	1	0
" "	460.150	1	5
Hartford, City of	465.025	1	10
" "	465.250	1	10
" "	460.500	1	10
" "	460.150	0	10
Hartland, Lamoille County	460.275	1	15
" "	460.450	1(M.R.)	15
" "	460.500	1	15
" "	465.025	0	15
" "	465.025	1(M.R.)	
Ludlow, Village of	460.150	1	5
" "	460.175	1	5
" "	460.500	1	5
" "	465.025	-	5
" "	465.025	1(M.R.)	
Lydonville, City of	465.025	1(M.R.)	5
" "	460.150	1	5
" "	460.200	1	5
Manchester, City of	460.050	1	5
" "	460.150	1	5
" "	460.500	1	5
" "	465.025)	1(CONTROL)	-
" "	465.025)		5
Middlebury, City of	465.025	1(M.R.)	-
Milton, City of	460.150	1	10
" "	460.500	1	10
" "	465.025		5
" "	460.175	1	10
" "	465.025	1(M.R.)	

LICENSEE (DEPT.)	FREQ.	BASE	MOBILES
Montpellier, City of	460.150	1	10
" "	460.175	1	10
" "	460.500	1	10
" "	465.025	1 (CONTROL)	
" "	465.025		10
Morristown Police, Town of	460.025	1	10
" "	460.150	1	-
" "	460.250	1	10
" "	460.500	1	10
" "	465.025	1 (CONTROL)	-
" "	460.150	1	10
" "	460.425	1	10
Newport, City of	460.150	1	10
" "	460.250	1	10
" "	460.500	1	10
" "	465.025	1 (CONTROL)	-
" "	465.025	-	10
Northfield, City of	460.175	1	5
" "	460.425	1	
" "	460.500	1	5
" "	465.025	1	5
" "	465.025	1 (MOBILE RELAY)	
Poultney, Town of (Dept. of Pub. Safety)	460.175	1	18
" "	460.500	1	18
" "	465.025		10
" "	460.200	1	5
" "	460.375	1	5
" "	460.500	1	5
Randolph, Village of	460.050	1	10
" "	460.150	1	10
" "	460.500	1	10
" "	465.025		10
" "	465.025	1 (MOBILE RELAY)	
Richmond, Town of	460.100	1	10
" "	460.150	1	10
" "	460.225	1	10
" "	460.500	1	10
" "	460.025	1 (MOBILE RELAY)	10
Rutland, City of	460.150	1	15
" "	460.200	1	15
" "	460.500	1	15
" "	465.025	1 (CONTROL)	15

LICENSEE (DEPT.)	FREQ.	BASE	MOBILES
Rutland, County of	460.450	1	6
" "	460.500	1	6
" "	465.025	1 (MOBILE RELAY)	6
South Burlington, City of	460.175	1 (MOBILE RELAY)	30
" "	460.150	1	30
" "	460.500	1	20
" "	465.025	1 (CONTROL)	30
Shelborne, Town of	460.150	1	10
" "	460.250	1	10
" "	460.500	1	10
" "	465.025	1 (CONTROL)	10
Springfield, Town of	460.150	1	10
" "	460.175	2	10
" "	460.500	1	10
" "	465.025	1 (CONTROL)	10
St. Albans, City of	460.050	1	10
" "	460.150	1	10
" "	460.500	1	10
" "	465.025	1 (CONTROL)	10
St. Johnsbury, Village of 46 Pearl Street	460.150	1	10
" "	460.200	1	10
" "	460.500	1	10
" "	465.025	1 (CONTROL)	10
Stone, Town of	460.250	1	5
" "	460.425	1	5
" "	460.500	1	5
" "	465.025	1 (MOBILE RELAY)	5
Swanton, Village of	460.050	1	5
" "	460.500	1	5
" "	460.150		5
" "	465.025	1 (MOBILE RELAY)	5
Vergennese, City of	465.025	1 (MOBILE RELAY)	

LICENSEE (DEPT.)	FREQ.	BASE	MOBILES
Vermont Dept. Pub. Safety (Base Relay Stations on 460.025 at 11 locations.)	460.475	-	400
"	460.425	-	400
"	460.025	(1 Base + Control)	400
"	460.150	1	-
"	460.275	1	400
"	460.325	1	400
"	460.500	1	400
"	460.300	1	-
"	460.225	-	400
"	460.375	-	400
Vermont - Dept. Correction	460.275	1	
" "	460.475	1	10
" "	460.500	1	10
" "	465.025	1 (MOBILE RELAY)	
Waterbury Police	465.025	1 (MOBILE RELAY)	5
" "	460.175	1	5
" "	460.425	1	5
" "	460.500	1	5
Williston, Town of	460.275	1	10
" "	460.500	1	10
" "	460.250	1	-
Wilmington, Town of	460.250	1	10
" "	460.150		10
" "	460.500	1	10
" "	460.025	1 (MOBILE RELAY)	10
" "	460.325	1	5
Wendham, County of	460.275	1	10
" "	460.450	1	10
" "	460.500	1	10
" "	465.025	1 (BASE)	10
" "	465.025	1 (CONTROL)	
Windsor, City of	460.150	1	10
" "	460.500	1	10
" "	460.125	1 (B.R.)	10
" "	465.125	1 (M.R.)	
" "	465.025		10

LICENSEE (DEPT.)	FREQ.	BASE	MOBILES
Windhall, Town of	460.150	1(M.R.)	5
" "	460.250	1(M.R.)	5
" "	460.375	1(M.R.)	5
" "	460.500	1(M.R.)	5
" "	460.025		5
" "	465.025	1(M.R.)	
Windoski, City of	460.150	1	10
" "	460.200	1	10
" "	460.500	1	10
" "	465.175	1	10
" "	465.025	1(CONTROL)	10
Woodstock, City of	465.025	1	5
" "	460.150	1	5
" "	460.250	1	5
" "	460.500	1	5

TOTAL MOBILES AUTHORIZED - TOWNS 466
STATE 400

AVERAGE - APPROX. 10/TOWN or 5 MOBILES/5 PORTABLES

END