Government of Canada
Department of Communications

Gouvernement du Canada
Ministère des Communications

NATIONAL TELECOMMUNICATIONS POLICY BRANCH
TELECOMMUNICATION REGULATORY SERVICE

RADIO SYSTEMS POLICY PROPOSAL

POLICY PROPOSALS FOR THE IMPLEMENTATION OF A NEW PERSONAL RADIO SERVICE IN THE BAND 890-960 MHz

MARCH 1983

Canada

ANNÉE MONDIALE DES COMMUNICATIONS
WORLD COMMUNICATIONS YEAR
AÑO MUNDIAL DE LAS COMUNICACIONES
1983

Policy Proposals for the Implementation of a New Personal Radio Service in the band 890-960 MHz

1. INTRODUCTION

The personal radio needs of Canadians have been met since 1962 with the inception of the General Radio Service (GRS). Since that time, both the needs of Canadians and what they expect in a communications service have changed dramatically and there is serious concern that the current service can no longer meet the needs of its users. In this proposal, the Department is continuing public consultation on the development of a new personal radio service in a new higher frequency band which will hopefully address the needs of Canadians.

In August 1979, the Department of Communications (DOC) published Notice No. DGTR-019-79 in the Canada Gazette Part I, entitled "General Radio Service-Personal Radio Communication Service 890-960 MHz band". This notice provided a brief outline of technical features for a possible new mobile service - the personal radio service proposed to operate in the band 890-960 MHz. Although the notice was wide ranging in character, it did not propose any particular sub-bands for this purpose nor the total amount of spectrum required. Nevertheless, responses to this notice indicated genuine interest in further developments of this type and this paper pursues this objective.

2. PURPOSE

The purpose of this paper is:

- to propose a radio systems policy for the development of a new personal radio service (PRS) which will satisfy the various diverse needs of potential Canadian users and require a minimum of regulation.

- to propose a spectrum utilization policy identifying the frequency bands selected for the operation of a personal radio service.

- to formally announce to all fixed system licensees in the sub-bands proposed for PRS operation that if approved and implemented, interference protection for fixed facilities from the new service will cease no earlier than April 1, 1985. Fixed users are therefore encouraged to plan accordingly.

3. BACKGROUND

The General Radio Service was introduced in Canada in 1962. It was intended to provide an economical means for personal or private business radio communications using 22 channels in the 27 MHz band. The number of channels was extended in 1977 to 40 channels to accommodate the rapid growth rate. Public demand for this service has increased steadily since its inception in 1962-63, when 13,500 licences were issued. However, as the licensed population approached the 1 million mark in 1979, it began to appear that this current service may be unsatisfactory to a large number of its users. As a result of this growth and the problems associated with it, the Department conducted a number of studies and initiated the aforementioned public consultation process. The results of these studies indicated a need for a new and improved service without the inherent difficulties associated with the current 27 MHz band.

Discussions concerning the PRS started within DOC as a result of a series of GRS symposiums held across Canada in 1977-78. A policy paper entitled, "Spectrum Allocation Policy in the 406-960 MHz Frequency Band", published in March 1979, suggested that "a small band for GRS operations might be so designated in the future".

Subsequently, in August 1979, a Gazette Notice entitled "General Radio Service - Personal Radio Communications Service 890-960 MHz" was released for public comment. Responses to this Notice were received from interested user groups, associations and manufacturers. The majority of the comments received were in favour of a new service and valuable input was also received in regards to the specific features of this service. The response, however, did not come to any consensus on the particular portions of the band to be allocated. Most of the respondents in favour of the new service supported its establishment within the band 890-960 MHz but outside the portion designated for Industrial Scientific and Medical (ISM) operations (902-928 MHz).

Also in August 1979, the Department published a Gazette Notice concerning the utilization of the radio spectrum in the Fixed service in the range 0.890-10.68 GHz. It was noted from the public response to this notice that fixed service users had particular concerns relating to the implementation of PRS in the band 890-960 MHz and it was suggested that any allocation to PRS should be on an exclusive basis.

The policy review of microwave usage in the bands 1-10 GHz took into consideration the possible eventual relocation of existing Fixed services in this band in many parts of the country. In this regard, the policy paper entitled, "Policy for the Utilization of the 0.890-10.68 GHz Radio Spectrum by the Fixed Service", released on December 11, 1982 identifies alternative bands for low and very low capacity of fixed systems. Effective with the release of the above-noted policy paper, new systems or extensions of existing systems in the 890-902 MHz and 928-942 MHz bands will be authorized

only on a non standard basis*. Furthermore, currently authorized systems operating in these bands designated non-standard will remain non-standard even if they modify their system.

4. Related Activities in Other Countries

Several European Countries have also considered the development of an inexpensive short range low power personal radio communications service. Recognizing the desirability of Canada/US compatibility for this type of service, the Department of Communications and the FCC have discussed aspects of the introduction of the new service. In the United States, a proposal for the creation of a new personal Radio Service was recently presented to the Federal Communications Commission (FCC). This proposal, initiated after a public survey conducted in the U.S.A. which supported its introduction calls for a total of 150 channels spaced 30 kHz apart in the band 890-960 MHz. This proposed service requires two 4.5 MHz paired bands for a total of 9 MHz.

The system proposes that a licensee would be able to purchase, at a modest price, a two station radio system (base and mobile). This system would provide a user with the ability to communicate mobile to mobile, mobile to base using a radio channel selected by control circuitry of the system. The system would also have the capability to interconnect with the public switched network through the licencees base station and would in this respect resemble an extended range "cordless telephone".

Also proposed are a very limited number of party line shared radio channels for use in communicating with other mobile or base stations as desired.

* Non-standard system - A system which is either non conforming to an SRSP or which is authorized before an SRSP has been issued for the band.

Standard system - A system which conforms to a current SRSP. (i.e., revised in accordance with the most recently issued Policy for the band).

It is proposed to limit call duration to a maximum of 3 minutes. The range of this equipment is expected to be 3 to 4 km between mobiles and about 8 km between base and mobile. A range of about 25 km would be possible by the use of repeaters which are to be permitted in this service.

5. Factors in the Selection of a Frequency Allocation for a New Personal Radio Service

Mobile service allocations were added to much of the band 890-960 MHz by WARC'79 on a primary co-equal basis to the fixed service. These mobile allocations now provide for the introduction of a proposed PRS.

There are, however several factors to be considered before any mobile service may be assigned frequencies in this band. The fixed service operations are located throughout the band with concentrated use in certain portions and in certain geographic areas. It is therefore necessary, since the PRS will probably be operational before other Mobile operations in the band, that the sub-allocation to PRS, to the extent possible, be made in those portions of the band containing the lowest concentration of existing fixed service assignments. Existing users, if unable to accept the probability of interference from PRS, may choose to relocate to other appropriate bands after a suitable warning as indicated in the policy for the Fixed service in the range 0.890-10.68 GHz and specified in Section 8 of this paper.

In order to accommodate two frequency repeater operations and other service features envisioned, spectrum allocation for PRS would have to be made in two separate frequency blocks with sufficient frequency separation to permit duplex or two frequency operation. These features are described in section 7.

The amount of spectrum required for PRS would depend on several factors such as system operation, system design, number of users to be served in any given area, etc. It is also clear that a PRS service would be developed for a North American market rather than a Canada-only market. For this reason, the overall terms of the service would be structured to serve North American requirements and a total of 8 MHz is proposed for this purpose. This allocation would be divided into two 4 MHz blocks located at 898-902 MHz and 937-941 MHz. The radio system is proposed to use frequency modulation (FM) with 25 kHz channel spacing. The following factors were considered in proposing these bands.

a) Allocation for PRS in frequency bands in which mobile service has co-primary allocation status shared with the fixed service.

b) Minimizes number of co-channel existing fixed users.

c) Sufficient frequency separation between the two 4 MHz blocks in order to facilitate development of equipment at a reasonable cost.

d) Canada/U.S. compatibility.

6. Regulatory Aspects

There are basically two areas of regulatory concern for this service.

1. Equipment related

2. Licensing

In order to minimize potential of interference between PRS users and from PRS users to systems operating in proximity to PRS frequencies, the Department intends to type approve PRS equipment. The type approval process would be similar to that used for the present General Radio Service (GRS). There may also be need for some minimum standards for the interface between base station equipment and the Public Switched Telephone Network (PSTN) if interconnection to the PSTN is to be permitted by the telephone carriers and their regulators.

The regulations governing licensing and operation of the PRS would be based on those in existence for the current General Radio Service and would permit personal and business applications. Licensing of the PRS equipment would be similar to the procedure followed for the GRS.

Within the frequency blocks set aside for the PRS, there could also be specific provision for channels to be assigned by nature of service (e.g. emergency, calling etc.) either by mutual consent and agreement of users or alternatively by regulation.

7. Implementation Considerations and Technical Features

The following is a list of features which the new PRS is proposed to offer:

- Automatic Transmitter Identification System (ATIS)

The intent of this feature is to provide ready identification of a transmitter for a number of purposes such as, identifying transmitters which cause interference, generally facilitate enforcement of the regulations and also to provide an appropriate identification for selective calling, repeater operation, telephone interconnect, and such other features that may evolve.

An ATIS number would be assigned to each PRS transmitter. This number would be automatically transmitted each time the transmitter is activated.

The Department seeks comments on:

i) Methods which could be used to assign ATIS numbers such as:

Providing a series of numbers to each manufacturer at the time type approval is granted. These would then be encoded in the set by the manufacturer. The code would be affixed to the set and would be required as part of the licensing information.

Providing the applicant with an ATIS chip at the time of licensing to render the set operative.

ii) Technical Parameters

Which modulation scheme(s) (e.g. FSK, PSK, etc) and bit rates (e.g. 300 BPS, 2400 BPS...) would be more appropriate for ATIS. Also should it be transmitted in the sub-audio portion of the channel or should it occupy the entire channel bandwidth.

In providing comments on this aspect, manufacturers, in particular should consider other features of the service such as digital transmission and selective calling.

Selective Calling

Each transceiver could have an identifier code (ATIS number or user selected code). Upon reception of its code on a calling channel, a transceiver could scan for a vacant channel and automatically report its choice to the calling transceiver.

Once a channel has been agreed upon, both transceivers would automatically tune to it.

This can involve a rather complex exchange of information between the two transceivers. Therefore, comments on the protocol that should govern this exchange of information are particularly welcome. (e.g. speed, code, sequences of exchange of information, etc.).

- Low Power Channels

A number of channels, intended for limited range communications would be assigned for low power operation. The transmitter would automatically reduce its output power when one of these channels is selected.

A specific advantage of this approach is that it would permit a greater number of people to communicate effectively in those instances where additional power is not required. It would increase the chances of finding an empty channel, decrease the potential for interference, reduce the power drain when operating on batteries and generally better utilize the spectrum.

Comments are therefore invited on the power levels, the number of channels to be assigned to each category and any other related areas.

- Length of Transmission Limiter

The Department is considering a number of ways to prevent channel monopolization by one individual. A control device could be built into the transceiver which would automatically disable the

transmitter after a predetermined length of continuous transmission time. It would also prevent the reactivation of the transmitter prior to the elapse of another predetermined length of time once the control mechanism has been activated. This control device would be inoperative on the Emergency Channel.

- Digital Transmission

This would involve the transmission of information using a digital modulation technique. Unlike the conventional analog systems, digital systems are widely varied in their rate of transmission, bandwidth occupancy, error performance and complexity. Digital information can be easily stored, delayed, processed and transmitted at different rates and in different formats. For instance a digital message may be transmitted in its entirety (message format) or it may, alternatively, be divided into a number of fixed size blocks to be transmitted one at a time (packet format). Moreover, a digital message can be stored in a buffer and then transmitted at a high speed hence occupying a wide bandwidth for a short period of time or it can be transmitted at low speed with a narrow bandwidth and long transmission time. Hence it is clear that digital transmission involves more trade-offs and more variables then analog transmission. Comments are invited on transmission format, communications protocol, etc.

The transmission of data between personal radio transceivers will allow for man-machine and machine-to-machine communications. Consequently it is important to determine the basis under which such frequency spectrum should be utilized. In particular, questions related to the overall spectrum requirements for data transmissions and the corresponding channelization schemes (if necessary) for both transceiver and repeater operations are of prime importance and should be addressed.

Again, equipment designers and manufacturers in particular are requested in their comments, to keep in mind the desirability of integrating these requirements for digital communications with these of such other features as ATIS and selective calling.

- Repeater Operation

This would involve a transmitter and receiver using specific channels installed in a given location which would receive signals on a given frequency and automatically re-transmit them on a different frequency. Repeaters could greatly extend the range compared to non-repeater operation.

The licensing of repeaters raises two issues:

(a) who should be licensed?

(b) should each repeater be licensed for a group of specific frequencies, or all frequencies set aside for repeater operation.

Due to the large number of channels involved in the repeater operation, the Department would not licence a single user for such an operation. It is envisaged that, similar to current repeater operations , radio common carriers, amateurs or clubs and associations of users would operate these PRS repeaters for a minimum fee to their subscribers.

- Telephone Interconnection

This would permit a transceiver to access the telephone network and place or receive a call to any telephone subscriber.

8. Relocation of Existing Fixed Users of the Proposed PRS Bands

The Department will provide as much lead time as possible so that licensees of existing fixed systems may assess the level of potential interference and restructure their systems accordingly. The policy announced December 11, 1982 entitled, "Policy for the Utilization of the 0.890-10.68 GHz Radio Spectrum by the Fixed Service", states that new systems or extensions of existing systems in the 890-902 MHz/928-942 MHz band will be licensed only on a non-standard basis. In addition, systems which are non-standard as a result of frequency diversity will remain non-standard even if they modify their operation to operate on a non-diversity basis in these bands. A minimum advance notification of two years will be given for any system change required. Alternative spectrum will be identified if a change in frequency is involved.

Fixed users are warned however that interference protection to their systems will not be guaranteed after April 1, 1985. However, the Fixed users may be able to operate on an interference free basis for some time after that date. The factors which would govern this period would be the implementation schedule adopted for the new PRS and its rate of deployment geographically in various areas of Canada.

9. Other Considerations

The Gazette Notice of August 1979 outlined several service and technical features of the proposed PRS and invited comments on these and also invited suggestions for any other desirable features. Subsequent review of these comments and further internal study within the Department has resulted in the service features proposed above as being the most desirable for the new Canadian Personal Radio Service. Comments on these and on any other aspects are invited.

As noted earlier, in selecting a frequency allocation for the PRS it is the Department's intention to continue consultation with the FCC on a mutually acceptable frequency allocation and on any other mutually interesting terms of the new PRS since it would seem desirable for both countries to facilitate a service which would permit roaming communication within Canada and the U.S. and which would minimize disruption to existing radio services.

10. Finalization of a Plan for a New Personal Radio Service

In presenting the information in this paper, the Department now invites written comments from all interested parties on the Personal Radio Service proposed in this paper. Submissions should refer to the publication date and Notice Number and should be addressed to the Director General, National Telecommunications Branch, 300 Slater Street, Ottawa, Ontario, K1A 0C8. All submissions must be postmarked no later than May 31, 1983.

Procedures for submitting written comments are outlined in attached Annex A.

DEPARTMENT OF COMMUNICATIONS
RADIO ACT

NOTICE N° DGTN-003-83/DGTR-002-83

Policy Proposals for the implementation of a New Personal Radio Service in the Band 890-960 MHz

In August 1979, the Department issued a Gazette Notice (DGTR-019-79) entitled, General Radio Service-Personal Radio Communications Service 890-960 MHz Band. This paper noted the current deficiencies and congestion in the existing 27 MHz General Radio Service due to the increased popularity of the service and proceeded to invite public comment in a number of areas towards the development of a new personal radio communications service in the band 890-960 MHz.

Having evaluated the submissions in response to these proposals, the Department is now proposing an improved Personal Radio Service in the band 890-960 MHz. The public release for comment of a paper entitled, Policy Proposals for the Implementation of a New Personal Radio Service in the Band 890-960 MHz, is hereby announced with the publication of this notice. The paper proposes to make a new allocation of spectrum for the establishment of the Personal Radio Service which will be arranged in two bands to permit two frequency operation and features not possible in the current GRS 27 MHz band. Copies of this paper may be obtained from the Departmental offices in Ottawa, Moncton, Montreal, Toronto, Winnipeg and Vancouver.

The Department now invites written comments from all interested parties on the Personal Radio Service proposed in this paper. Submissions should refer to the publication date and number of this Notice and should be addressed to the Director General, National Telecommunications Branch, Department of Communications, 300 Slater Street, Ottawa, Ontario, K1A 0C8. All submissions must be postmarked no later than May 31, 1983. Copies of submissions will be made available and retained for public inspection at the Department of Communications' Library, Room 1420, 300 Slater Street, Ottawa, for a period of one year, until May 31, 1984, and at the DOC Regional offices in Moncton, Montreal, Toronto, Winnipeg and Vancouver for a period of six months, until November 30, 1983.

Dated at Ottawa, this day of March 1983.

W.A.R. Johnston
Acting Director General
Telecommunication Regulatory Service

V. Hill
Director General
National Telecommunications Branch