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Department of Communications

Spectrum allocation policy in the 406 to 960 MHz frequency band

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SPECTRUM ALLOCATION POLICY IN THE 406 to 960 MHz FREQUENCY BAND

1. INTRODUCTION

The Department of Communications has reviewed the spectrum allocations in the 406-960 MHz frequency band with the objective of providing appropriate and adequate spectrum for all of the radio services concerned. Policies for this band have been used as a basis for the Canadian proposals to the 1979 World Administrative Radio Conference (WARC) which are being submitted to the International Telecommunication Union (I.T.U.) in Geneva.

Recognizing the potential impact of changes in spectrum allocations, the Department initiated a formal public consultation process by means of a notice in the Canada Gazette in August 1976. At that time, a background paper entitled Spectrum Allocations in the 406-960 MHz Frequency Band, was released to outline the issues involved and to invite public comment on ways to resolve them. Numerous briefs and comments were received from interested parties in support of the various radio operations within the 406-960 MHz band.

In December 1977, after reviewing the briefs and comments received, the Department published a second paper entitled A Discussion Paper on Canadian Spectrum Allocations in the 406-960 MHz Frequency Band which outlined and discussed the issues raised in the submissions made to the Department and which proposed a policy approach and certain allocation changes to

satisfy Canada's domestic spectrum requirements in this band. Comments on these proposed policies were invited and were to be submitted within 90 days of the date of publication of the Gazette Notice. Having concluded this extensive review of the 406-960 MHz band, the government has now decided upon an allocation policy for this portion of spectrum.

This policy paper outlines the new allocations for the 406-960 MHz band (see Appendix "B"), briefly presents the major considerations reflected in the policy and invites comment on issues associated with an orderly and efficient implementation of the new spectrum utilization policy.

2. CONSIDERATIONS

The new Canadian Table of Frequency Allocations for the 406-960 MHz band, as shown in Appendix "B", contains allocations to the amateur, broadcasting, fixed, mobile, radio astronomy, mobile-satellite and radiolocation services and to industrial, scientific and medical (ISM) operations. The extent of use of the 406-960 MHz band varies among services and regions of the country. In general, however, it is primarily the land mobile and broadcasting services that are experiencing congestion at the present time and then only in major urban areas.

Concerning the 470-890 MHz band (UHF TV channels 14 to 83), the December 1977 Discussion Paper suggested that virtually all forecast requirements for UHF television broadcasting could be accommodated in a reduced UHF TV band (channels 14 to 69) if improved television receivers using current state-of-the-art technology achieved substantial market penetration, thereby resulting in the same or a greater number of channels in the

reduced band than are available in the full band (channels 14 to 83). While improved technical performance of television receivers is still seen as a desirable objective in achieving more efficient utilization of the radio spectrum, further development is required and it is apparent that the benefits from a widespread utilization of improved TV receivers will accrue only in the long term.

The Discussion Paper also noted that the use of new, more efficient techniques for allotting television channels, even with today's receivers, might enable the same number of channels as is presently contained in the TV allotment plan to be accommodated in a reduced block of spectrum. As a result of continued analysis and further optimization of these allotment techniques, which involve classifying stations according to the extent of coverage required, it has now been determined that adoption of these techniques would enable virtually all forecast television broadcasting requirements to be satisfied within UHF TV channels 14 to 69 making possible the reallocation of the 806-890 MHz band to satisfy the requirements of the mobile service. These improved television channel allotment techniques are measures which will be initiated immediately, recognizing that the introduction of improved television receivers, at a future date, could result in an even greater availability of channels.

In the band 608-614 MHz, mobile-satellite except aeronautical mobile-satellite (earth-to-space) has been added on a secondary basis in order to provide sufficient spectrum for this service while providing full protection to radio astronomy operations. The requirement for spectrum for the mobile-satellite service was noted in Canada's second draft WARC proposals for the 1979 (ITU) World Administrative Radio Conference.

As was suggested in the Discussion Paper, the 410-420 MHz allocation for mobile and fixed service in Canada is being extended upward to 430 MHz and downward to 406.1 MHz. In the upward extension, provision is being made, however, to permit radiolocation operations to continue in this portion of the spectrum in coastal and off-shore regions of Canada on a non-interference, non-protected basis for those systems whose operations cannot be fully accommodated in the 430-450 MHz radiolocation band. It should be noted, however, that increased radiolocation operations in times of national or international emergencies could result in mobile operations in the 420-430 MHz band being disrupted. The fixed service is also added to the 420-430 MHz band on a secondary basis subject to the same considerations noted above. The footnote which provided for the operation of radio altimeters in the 420-460 MHz band has been suppressed since the requirement in Canada for such operations no longer exists. In the downward extension to 406.1 MHz, the mobile service except aeronautical mobile and the mobile-satellite service except aeronautical mobile satellite (earth-to-space) are added on a primary basis. The fixed service and the aeronautical mobile satellite (earth-to-space) service are also added on a secondary basis. Geographical sharing with the radio astronomy service will be required in this band.

As was outlined in the December 1977 Discussion Paper, consideration is being given to the provision of additional spectrum for the continued development of the General Radio Service. While no allocation is included at the present time, a small band for GRS operations might be so designated in the future.

Some changes which appear in the new Canadian Table of Frequency Allocations and which differ from those proposed in the December 1977 Discussion Paper are editorial in nature. Details such as those which identify usage of spectrum allocated to the fixed service by system capacity (e.g., 6 to 48 voice channels) are more properly found in Departmental standards and specifications rather than in the Table of Frequency Allocations.

3. NEWLY ALLOCATED MOBILE SPECTRUM

The allocation of spectrum to a service is but a first step toward the eventual licensing of systems. It is necessary to plan carefully the utilization of such spectrum by determining the type, capacity and operation of systems that will be permitted. In the case of spectrum for the mobile service, the Department considers suballocations desirable to segregate as a minimum two types of usages. One requirement for a suballocation follows from the need to retain reasonably large blocks of frequencies in reserve for certain systems in order to permit efficiencies in cost and spectrum utilization as such systems grow to full capacity. Generally, systems which fall into this category are operated by an entity which provides telecommunication services to the general public. Other systems, usually smaller in capacity, more numerous in quantity and having a more limited potential for growth, would fall into a second suballocation. Normally, systems which fall into the second category are operated by the entity which is the end user of the communication facilities.

The band 410-420 MHz which is being extended upward to 430 MHz and downward to 406.1 MHz will provide only a limited number of additional channels for mobile operations and then only in certain geographic areas. The 406.1-410 MHz band, in general, can accommodate systems only in those areas where protection to the two main radio astronomy sites can be ensured. The 410-420 MHz band is already heavily utilized in many parts of the country, and systems operating in the 420-430 MHz band will be subject to the considerations indicated in Section 2 above. It should be noted that the bands 406.1-410 MHz and 420-430 MHz are in use in the United States by radio services including fixed, mobile and high power radiolocation, and thus coordination in extended areas along the border may be required. It would appear, therefore, that only medium capacity systems of the first type above could be accommodated in bands in the vicinity of 400 MHz and then only on

something less than a national basis. Such systems could, however, provide immediate relief for the public mobile radiotelephone service and thus meet the short-term needs of this service. A suballocation to such systems being considered is 409-410 MHz and 420-421 MHz with the licensing of specific frequencies in border areas requiring coordination with the U.S. authorities. Though a complete channelling plan is presently being developed within the Department,it is intended that the 406.1-409 MHz band would provide for simplex mobile operations, and, on a secondary basis, fixed operations while the band 421-430 MHz would provide for duplex mobile operations. Operations in 410-420 MHz would continue to be in accordance with the existing channelling plan for this band. The finalization of channelling plans for the new allocations awaits the successful conclusion of those activities outlined as part of the implementation considerations shown in Section 5 below.

In the longer term, the 806-890 MHz band will be used to provide for the growth of mobile services. However, licensing in this newly allocated spectrum will not be undertaken until the band has been fully planned, encouraging utilization of state-of-the-art technology to ensure spectrum efficiency and until certain activities, as outlined in the Section 5 below, are completed. Therefore, as indicated in the Gazette Notice contained in Appendix "A", the Department now invites submissions from interested parties as to the system configurations, suballocations and institutional arrangements needed to provide future mobile service in Canada in this band. There are many questions to be addressed such as the type of mobile services required, the impact of new technology on such services and on spectrum utilization, the use of trunked, cellular or modified cellular designs, and the need for national standards in signalling and control. However, it is felt that any proposal for a high capacity public mobile radiotelephone system requiring frequencies to be held in reserve for future growth, must be national in scope with a commitment for an inaugural service date. As specified in the Gazette Notice, all submissions received will be made public.

4. OPPORTUNITIES FOR CANADIAN INDUSTRY

In those countries where the decisions have already been taken to allocate additional spectrum to mobile services, new equipment and systems of advanced technology are being developed to take advantage of the market opportunity. A number of Canadian manufacturers are capable of undertaking this development work, but the commitment of R&D resources and plant investments has understandably awaited a clear indication of the government's intent to provide additional spectrum. By issuing this policy, the government is making this intent public so as to enable Canadian industry to plan its participation in the improvement and expansion of mobile services; comments from this sector on the introduction of new technology to be utilized in the newly allocated mobile spectrum would be particularly appreciated.

5. IMPLEMENTATION CONSIDERATIONS

The December 1977 Discussion Paper advanced certain objectives for the maximization of any benefits which would accrue from the proposed re-allocations. These objectives necessitated discussions with the government of the United States of America. Such discussions have taken place and an agreement in principle has been received on these points by means of an exchange of diplomatic notes. Detailed arrangements are now being finalized that would provide for (1) a new Canadian TV allotment plan, incorporating the use of the new allotment techniques and which will include replacement channels for those stations now operating above channel 69, (2) an equitable sharing of newly allocated mobile spectrum along the U.S./Canadian border, and (3) the initiation of processes in the U.S. which could eventually result in the introduction of improved TV receivers. These detailed arrangements will need to incorporate technical considerations to ensure full protection to the reception of TV channels 14-69 inclusive in the new Canadian TV allotment plan, so

as to permit a controlled introduction of mobile systems in the newly allocated spectrum within the co-ordination zone in both countries without disrupting or limiting TV services. And, to this end, it may be necessary for the Department to specify the order in which the allotments are to be utilized in a particular community.

Until the new TV allotment plan has been finalized, Technical Construction and Operating Certificates (TCOC's) for new stations will, in general, not be issued for UHF television broadcasting undertakings in the Quebec-Windsor corridor; however, there may be exceptions, and the Department will treat each application on a case by case basis. Discussions are currently underway with the United States to resolve uncertainties on both sides of the border concerning available TV channel allotments. Stations now operating in the 806-890 MHz band will be protected until a new TV allotment plan is finalized and until such time as the Department re-assigns these stations to chanels compatible with this plan.

APPENDIX "A"
NOTICE PUBLISHED IN THE
CANADA GAZETTE, PART I
DEPARTMENT OF COMMUNICATIONS

Ref: DGTN-001-79
DGTR-003-79

Subject: Release of Policy Paper on Canadian Spectrum Allocations in the 406-960 MHz Frequency Band

In December 1977, the Department invited submissions from all interested parties on the proposed spectrum allocations in Canada in the 406 to 960 MHz frequency band which were outlined in a paper entitled A Discussion Paper on Canadian Spectrum Allocations in the 406-960 MHz Frequency Band.

Following a review of the submissions received, the government has decided upon an allocation policy for this portion of the spectrum. This policy is outlined in a paper entitled Spectrum Allocation Policy in the 406 to 960 MHz Frequency Band. Copies of this paper may be obtained from Information Services, Department of Communications, 300 Slater Street, Ottawa, Ontario, K1A 0C8 (phone 613-995-8185), or from DOC regional offices in Vancouver (phone 604-666-8530), Montreal (phone 514-283-5065), (phone 506-858-2094), Winnipeg (phone 204-949-4391), and Toronto (phone 416-966-8215).
Pursuant to the policy determination just completed, and with a view to the eventual introduction and licensing of mobile systems in Canada in the 806-890 MHz band, submissions from all interested parties on such future mobile systems are now invited. These submissions for review by the undersigned should be addressed to the Director General, Telecommunication Regulatory Service and must be postmarked not later than 120 days from the date of publication of this notice. Copies of these submissions will be made available for public inspection at the Department of Communications library, Room 1420, 300 Slater Street, Ottawa, and at all of the DOC regional offices as listed above.

Dated at Ottawa, this 3rd day of March 1979

J. deMercado
Director General
Telecommunication Regulatory Service

K.T. Hepburn
Director General
National Telecommunications Branch

APPENDIX "B"

Table of Frequency Allocations in the 406-960 MHz Band

PREVIOUS DOMESTIC ALLOCATIONS	NEW DOMESTIC ALLOCATIONS
406 - 406.1 MHz MOBILE-SATELLITE (Earth-to-Space)	406 - 406.1 MHz MOBILE SATELLITE (Earth-to-Space)
317A	317A
406.1 - 410 MHz RADIO ASTRONOMY	406.1 - 410 MHz RADIO ASTRONOMY MOBILE (except aeronautical mobile) MOBILE-SATELLITE except aeronautical mobile satellite (Earth-to-Space) Fixed
233B	233B 315E
410 - 414 MHz MOBILE (except aeronautical mobile) Fixed	410 - 414 MHz MOBILE (except aeronautical mobile) Fixed
414 - 415 MHz FIXED Mobile (except aeronautical mobile)	414 - 415 MHz FIXED Mobile (except aeronautical mobile)
415 - 419 MHz MOBILE (except aeronautical mobile Fixed	415 - 419 MHz MOBILE (except aeronautical mobile) Fixed
419 - 420 MHz FIXED Mobile (except aeronautical mobile)	419 - 420 MHz FIXED Mobile (except aeronautical mobile)
420 - 450 MHz RADIOLOCATION Amateur	420 - 430 MHz MOBILE (except aeronautical mobile) Fixed
318 319A 320A	C72 C73
	430 - 450 MHz RADIOLOCATION Amateur
	319A 320A
450 - 470 MHz MOBILE 318B 318C Fixed	450 - 470 MHz MOBILE 318B 318C Fixed
C28 C43 C44 C45 C46 318 319A	C28 C43 C45 319A Mod C44 C74
470 - 608 MHz BROADCASTING	470 - 608 MHz BROADCASTING

608 - 614 MHz
RADIO ASTRONOMY

332

614 - 890 MHz
BROADCASTING

332A

890 - 942 MHz
FIXED
RADIOLOCATION

C47 340 339A

942 - 960 MHz
FIXED

C47 339A

608 - 614 MHz
RADIO ASTRONOMY
Mobile-Satellite except aeronautical mobile satellite (Earth-to-Space)
332

614 - 806 MHz
BROADCASTING

332A

806 - 890 MHz
MOBILE

XX C75

890 - 902 MHz
FIXED
Radiolocation

339A

902 - 928 MHz
FIXED
Radiolocation
Amateur

339A 340

928 - 942 MHz
FIXED
Radiolocation
339A

942 - 960 MHz
FIXED
339A

CATEGORIES OF SERVICES:

1. Services the names of which are printed in capital letters, e.g., FIXED, are primary services.

2. Services the names of which are printed in lower case letters e.g., Fixed, are secondary services. Stations of a secondary service:

   a) shall not cause harmful interference to stations of primary services to which frequencies are already assigned or to which frequencies may be assigned at a later date;

   b) cannot claim protection from harmful interference from stations of a primary service to which frequencies are already assigned or may be assigned at a later date;

   c) can claim protection, however, from harmful interference from stations of the same or other secondary service(s) to which frequencies may be assigned at a later date.

NEW AND MODIFIED FOOTNOTES

Canadian Footnotes

Modified - C44	The operation of remote broadcast pickups and studio transmitter links is authorized in the bands 450 - 451 MHz and 455 - 456 MHz for the transmission of narrowband broadcast radio programming.
Add - C72	On the condition that harmful interference is not caused to the mobile or the fixed services, the Department may authorize frequencies between 420 and 430 MHz for use on a non-protected basis by the radiolocation service in coastal and off-shore regions of Canada where such radiolocation operations may not be fully accommodated in the 430 - 450 MHz frequency band.
Add - C73	The use of the band from 420 to 430 MHz by the mobile (except aeronautical mobile) and the fixed services in Canada is limited to applications which may suffer disruption or curtailment during periods of national or international emergency. The authorization of radio systems operating in this band will be subject to coordination between the administrations concerned and those having services operating in accordance with the Region 2 Table of Frequency Allocations which may be affected.
Add - C74	In Canada, the frequency band from 468.8125 to 468.8500 MHz is allocated on a primary basis for earth exploration satellite applications and on a secondary basis to the mobile service. Mobile operations in this frequency band authorized prior to January 1, 1979, may continue to operate with primary status.
Add - C75	Television broadcast stations licensed prior to January 1, 1979, to operate in the frequency band 806 - 890 MHz (channels 70 to 83) may, subject to periodic review, continue to operate in this band on a primary basis until reassigned to a channel in the 470 - 806 MHz band (channels 14-69).

International Footnotes

Add - 315E	In Canada, the band 406.1 - 410 MHz is also allocated to the aeronautical mobile-satellite service (Earth-to-Space) on a secondary basis. The use of the band by the aeronautical mobile-satellite service will be restricted to geographical areas remote from all radio astronomy observatories.

Add - XX

In Region 2, the band from 806 to 890 MHz is also allocated to the mobile-satellite service for the use and development of systems using space radio-communications techniques. Such use and development is subject to agreement and coordination between the administrations concerned and those having services, operating in accordance with the table, which may be affected.

Add - YY

In Canada, the band 420 - 430 MHz is allocated on a primary basis to the mobile, except aeronautical mobile, service and on a secondary basis to the fixed service.