Industry Canada Industrie Canada

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Spectrum Management and Telecommunications

Spectrum Utilization Policy

Spectrum Utilization Policy, Technical and Licensing Requirements for Broadband Public Safety in the Band 4940-4990 MHz

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Canada

Department of Industry

Radiocommunication Act

Notice No. DGTP-005-06 — Spectrum Utilization Policy, Technical and Licensing Requirements for Broadband Public Safety in the Band 4940-4990 MHz

Intent

The purpose of this notice is to announce the release of the above-mentioned spectrum document to accommodate public safety use of spectrum in the band 4940-4990 MHz.

Background

In July 2004, the Department added a primary mobile allocation in the band 4940-4990 MHz and designated its use for fixed and mobile systems in support of public safety. The Department indicated that the use of the band would be subject to further consultation regarding appropriate licensing and technical considerations.

Subsequently, the Department received comments from several Canadian public safety agencies in support of this allocation. These agencies stressed how critical the band 4940-4990 MHz is to advanced broadband technologies, in order to enable high-speed wireless transfers of large files, images and video, as well as intranet access, at specified locations. These agencies further stressed the importance of dedicated spectrum for broadband applications.

In July 2005, the Department released a consultation on the use of the band through *Canada Gazette* notice no. DGTP-005-05. This consultation proposed policy, technical and licensing considerations to accommodate public safety agencies' early implementation of critical broadband systems in the band 4940-4990 MHz.

Consultation

Comments in response to the consultation generally supported the Department's proposals on use, applications, channelling plans, technical requirements and eligibility. Further comments however will be sought by the Department on the original proposed licensing fee in a separate *Canada Gazette* notice.

Discussion

The Department has worked diligently over the past years towards improving the critical communication and infrastructure of public safety agencies as well as ensuring access to spectrum resources. The provision of public safety and national security services rely heavily on advanced communications. The need for new wireless technologies and radio applications has put significant pressure to find priority spectrum for these requirements. This release of Spectrum Utilization Policy 4940 MHz represents an example of the Department's commitment to address the public safety and security spectrum needs.

Details of the spectrum policy, eligibility, technical and licensing provisions, including licensing fees, to allow public safety agencies' early implementation of critical broadband systems in the band 4940-4990 MHz, are specified in SP 4940 MHz. Applicants are encouraged to contact their local district director for further licensing information.

Obtaining Copies

Copies of this notice and documents referred to herein are available electronically on the Spectrum Management and Telecommunications website at: http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/home

Official printed copies of Canada Gazette notices can be obtained from the Canada Gazette website at: http://www.gazette.gc.ca/index-eng.html or by calling the sales counter of Canadian Government Publishing at (819) 941-5995 or 1 800 635-7943.

June 9, 2006

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1. Intent

This spectrum utilization policy, announced in *Canada Gazette* Notice no. DGTP-005-06, addresses the principal issues governing the implementation of public safety services in the band 4940-4990 MHz, including eligibility, licensing, technical and service rules.

2. Background

Public safety agencies have indicated to Industry Canada how critical the band 4940-4990 MHz is to support advanced broadband technologies enabling high-speed wireless transfers of large files, images and video, as well as intranet access, at specified locations. These agencies have also indicated that they require dedicated spectrum for critical broadband applications the same way they depend on narrowband voice systems today.

In July 2004, Industry Canada updated Spectrum Utilization Policy 3-30 GHz, *Revisions to Spectrum Utilization Policies in the 3-30 GHz Frequency Range and Further Consultation* (SP 3-30 GHz), adding a primary mobile allocation in the band 4940-4990 MHz and designating its use for fixed and mobile systems in support of public safety. SP 3-30 GHz also outlined steps to prepare incumbents in the band 4940-4990 MHz for future public safety broadband operations. First, a moratorium was placed on new non-Government of Canada (GoC) fixed systems in the band 4400-4940 MHz. Canadian footnote C25 allocated exclusive rights to the GoC for the use of the fixed and mobile services, on a primary basis, in the band 4400-4940 MHz. Existing fixed systems in this band have been grandfathered.

In July 2005, Industry Canada released a consultation paper entitled *Proposed Spectrum Utilization Policy, Technical and Licensing Requirements for Broadband Public Safety in the Band 4940-4990 MHz* (Notice No. DGTP-005-05) which afforded stakeholders the opportunity to comment on policy, technical and licensing requirements for broadband public safety spectrum in this band. In this paper, a moratorium was placed on the licensing and use of GoC fixed systems in the band 4940-4990 MHz, rendering the band well-positioned for public safety broadband operations.

The Department has worked with the public safety community to facilitate the improvement of the critical communication infrastructure of public safety agencies over the past years to address equipment interoperability, open standards, and improved access to spectrum resources in existing and new bands. There has also been extensive participation in international forums with the development of the International Telecommunication Union – Radiocommunications (ITU-R) Report M. 2033 (2003) *Radiocommunication objectives and requirements for public protection and disaster relief* and with Resolution 646 (WRC-03) *Public protection and disaster relief (PPDR)*. These documents provide guidance for future advanced solutions to satisfy the operational needs of PPDR organizations.

In the United States, the band 4940-4990 MHz was transferred from federal government to non-government use in 1999. Subsequently, the Federal Communications Commission (FCC) proposed to allocate this band to non-government fixed and mobile services, excluding the aeronautical mobile service, on a co-primary basis and concluded that the public interest would best be served by designating the band for use in support of public safety. The FCC has since adopted the licensing and service rules including eligibility, channelling plans and how to minimize the impact on radio astronomy operations.

3. Policy Objectives

The government is opening broadband spectrum for public safety services. The Department stands committed to preserving the highest level of safety and security for its citizens and to working with the public safety community to increase the effectiveness of their critical communications systems.

The Department is also committed to improving mutual aid and border security. Therefore it is essential for Canada to harmonize with the U.S. to facilitate interoperable networks and services with public safety agencies. Moreover, common use of spectrum for public safety will result in the development of compatible equipment for both countries, resulting in greater economies of scale.

4. Spectrum Usage and Structure

4.1 Fixed and Mobile Use

The band 4940-4990 MHz is allocated for both fixed and mobile services in support of many public safety applications. The primary designated use of this band will be mobile broadband applications as well as fixed linked systems in support of the mobile systems.

Fixed systems not operating as part of the mobile public safety 4940-4990 MHz system may be licensed for other public safety communication systems, on a secondary basis at the discretion of the district director of the local Industry Canada office.

Comments were sought on the types of public safety networks and applications which are likely to be deployed in Canada. Respondents highlighted several types of networks (e.g. peer-to-peer, ad-hoc and mesh). Examples of future advanced public safety applications include: enhanced dispatch services, improved records management systems and database access, high quality imaging (e.g. missing person images, fingerprints, maps and building layouts), file sharing, remote printing, software upgrades (e.g. virus software), Internet access, intranet access, e-mail, VoIP and real-time video.

Comments were also sought on the requirement and purpose for Canadian aeronautical mobile services in the band 4940-4950 MHz. Flexibility allowing various applications, including aeronautical mobile, to coexist was requested. However, no specific purpose was outlined. Other respondents reinforced that airborne operations should not be permitted to interfere with public safety ground-based systems and noted they should only be permitted on a case-by-case basis.

Decision:

The Department reaffirms the designation of the band 4940-4990 MHz for both fixed and mobile applications used in support of public safety for the preservation of life and protection of property. The Department further confirms that aeronautical mobile applications will not be permitted, except on a case-by-case basis.

4.2 System Technology

In the consultation paper of July 2005, the Department encouraged the use of "smart" technologies to facilitate the sharing of the band by several users. These technologies provide solutions that use frequency hopping (also known as spread spectrum) and dynamic frequency selection to minimize interference.

Licensees will benefit from the use of "smart" technologies which minimize interference, and subsequently the need to coordinate with other licensees in close proximity. Users will require less time to establish a radio link and will therefore have faster access to communications and critical information.

Conventional technologies require more coordination to achieve similar results when licensees operate their systems in close geographic proximity. As the number of public safety licensees increase, coordination may become more difficult.

Most respondents supported having flexibility in regulation and were of the view that "smart" technologies should be encouraged, but not mandated.

Decision:

The Department encourages the use of "smart" technologies but will not mandate specific technologies. Licensees will be expected to coordinate operations with other licensees in order to minimize and resolve any interference issues.

4.3 Channelling Plan

The Department proposed a channelling plan consisting of ten, 1 MHz channels and eight, 5 MHz channels harmonized with the FCC's channelling plan.

Channel Designation	Lower Frequency (MHz)	Upper Frequency (MHz)	Channel Bandwidth (MHz)
A	4940	4941	1
B	4941	4942	1
C	4942	4943	1
D	4943	4944	1
E	4944	4945	1
F	4945	4950	5
G	4950	4955	5
H	4955	4960	5
I	4960	4965	5
J	4965	4970	5
K	4970	4975	5

Channel Designation	Lower Frequency (MHz)	Upper Frequency (MHz)	Channel Bandwidth (MHz)
L	4975	4980	5
M	4980	4985	5
N	4985	4986	1
O	4986	4987	1
P	4987	4988	1
Q	4988	4989	1
R	4989	4990	1

Respondents generally supported the proposed channelling plan. Major suppliers have begun product development based on this channelling plan which will enhance cross-border interoperability. It will also provide users with maximum flexibility to employ existing technologies to facilitate economies of scale and to allow for the implementation of future broadband technologies.

Other respondents indicated that a sub-allocation plan to consider different channel combination schemes and overlapping channels could be adopted based on different applications.

Comments were also requested on the requirement for separate channels for fixed and mobile applications. The Department was informed that not only was there no requirement for separate channels but that the applicability of the band would be severely limited by providing such channels.

Decision:

The Department adopts the proposed channelling plan as described in the table above and reaffirms that channels are available only on a shared basis and will not be assigned for the exclusive use of any licensee. No sub-allocation plan will be adopted. Channels may be aggregated or partitioned for higher capacity or higher bandwidth applications to allow maximum flexibility and implementation of future broadband technologies. See Section 7.3 for system coexistence guidelines.

4.4 Incumbents

Since the release of the SP 3-30 GHz in October 2004, all incumbents in the band 4940-4990 MHz, with the exception of radio astronomers, have retuned, thus clearing the band for the new public safety designation. Canada has two radio astronomy observatories, one in Penticton, British Columbia and the other in Algonquin, Ontario. The radio astronomy service is allocated in the band 4950-4990 MHz on a primary basis and is protected under international footnote 5.149[1] from harmful interference.

Accordingly, the Department sought comments on what restrictions and technical criteria should be adopted by public safety licensees to ensure the continued protection of these observatories.Most respondents believe it unlikely that public safety applications will interfere with radio astronomy

[1] See *Canadian Table of Frequency Allocations 9 kHz to 275 GHz* (2005 Edition)

operations and do not recommend specific technical protection criteria. However, they suggest that the Department clearly identify any radio astronomy operational requirements that would be necessary to minimize potential interference between the two applications.

It is the understanding of the Department that the use of these sites is minimal and that no technical requirements or criteria are needed at this time. Similarly, the FCC have placed no restrictions other than to ensure that licensees operating in the band 4950-4990 MHz protect radio astronomy observatories to the extent required under U.S. footnote 74.[2]

Decision:

The Department confirms that technical requirements are not needed at this time to safeguard radio astronomy services in the band 4950-4990 MHz located in Penticton, British Columbia and Algonquin, Ontario. However, public safety licensees must ensure that these sites are protected should any future requirements emerge.

5. Eligibility

The Department proposed that eligibility requirements for this band be consistent with the hierarchy of safety service providers detailed in Spectrum Utilization Policy 30-896 MHz, Part 1, *Spectrum Allocation and Utilization in Certain Bands in the Range 30.01-896 MHz* (SP 30-896 MHz, Part 1) and Standard Radio Systems Plan 502, *Technical Requirements for Land Mobile and Fixed Radio Services Operating in the Bands 806-821/851-866 MHz and 821-824/866-869 MHz* (SRSP-502).

Stakeholders were invited to provide feedback on the proposed eligibility hierarchy and criteria as well as whether flexibility should be considered in certain areas of the country where priority needs have been met and unused frequencies remain. Most respondents concurred with the Department's proposed hierarchy but suggested that reference to the terms "trunked" and "conventional" be removed.

Generally respondents support permitting increased flexibility where priority needs have been met and significant unused frequencies remain. However, some suggest that the scope of "increased flexibility" be more specific. For example, flexibility could be considered, but arrangements for access must place public safety communications over the needs of non-public safety communications for non-critical activities.

Several respondents noted that regardless of the geographical location it is premature to include provisions that may permit this band to be used for purposes other than public safety. The Department concurs that at this time this spectrum is to be reserved exclusively for public safety use for the preservation of life and the protection of property.

[2] US74 In the bands 25.55-25.67, 73.0-74.6, 406.1-410.0, 608-614, 1400-1427 (see US368), 1660.5-1670.0, 2690-2700, and 4990-5000 MHz, and in the bands 10.68-10.7, 15.35-15.4, 23.6-24.0, 31.3-31.5, 86-92, 100-102, 109.5-111.8, 114.25-116, 148.5-151.5, 164-167, 200-209, and 250-252 GHz, the radio astronomy service shall be protected from unwanted emissions only to the extent that such radiation exceeds the level which would be present if the offending station were operating in compliance with the technical standards or criteria applicable to the service in which it operates. Radio astronomy observations in these bands are performed at the locations listed in US311.

Respondents suggested that public safety entities be permitted to enter into partnership agreements. They also suggested that these agreements should be at the discretion of public safety entities and that the sole purpose should be in support of public safety operations in their jurisdictional areas.

The Department will issue licences to public safety agencies based on the priority established through the categories listed below and the criteria as outlined. The Department encourages public safety agencies to establish partnerships for the sharing of networks to increase efficiencies and facilitate interoperability. Where one network serves more than one public safety entity, the licence will be issued to the entity(ies) operating the network, and only one licence fee will be charged.

Furthermore, the Department recognizes that in some cases, non-public safety entities may be best equipped to provide network services on behalf of the public safety community. As such, non-public safety entities are eligible to apply for a licence. However, non-public safety entities must demonstrate to the district director that their use of the band will be exclusively for public safety communications, specifically for the preservation of life and protection of property. Upon the implementation of a new system, and on an ongoing basis, the needs of Category 1 users will be given priority over the needs of any other public safety entity.

Decision:

Spectrum in this band must be used exclusively for public safety communications, specifically for the preservation of life and protection of property.

The Department adopts the licensing hierarchy as follows:

- Category 1 - police, fire, and emergency medical services;
- Category 2 - forestry, public works, public transit, dangerous chemical clean-up, customs, and other agencies contributing to public safety; and
- Category 3 - other government agencies and selected supervisory personnel of certain non-government agencies (e.g. hydro and gas utilities).

The Department adopts the following licensing guidelines:

- Entities applying for a licence to exclusively serve Category 1 agencies are eligible to be licensed for mobile broadband systems.
- Entities applying for a licence to serve Category 2 and 3 users may be deemed eligible at the discretion of the local district director where the district director is satisfied that the licensing will not hinder the development and use of systems dedicated to the higher priority Categories.
- Where applicants are not a public safety agency, they must demonstrate which public safety agency(ies) they will be serving. The same licensing hierarchy, as noted above, applies.

6. Licensing Issues

6.1 Spectrum Licensing

As noted in Section 4, the band 4940-4990 MHz is primarily allocated to mobile broadband systems. Each licensee will be granted a spectrum licence for the full 50 MHz covering their area of jurisdiction. Individual site-licences will not be required. However, licensees may be required to provide technical information which would be entered into a database. Details regarding the process and format required for submission of this information are outlined in Client Procedures Circular 2-1-23 *Licensing Procedure for Spectrum Licences for Terrestrial Services* (CPC-2-1-23). Licensees in the same or overlapping geographical area will be required to cooperate and coordinate usage of this band.

6.1.1 Licence Term

The Department proposed and maintains that spectrum licences be issued for the band 4940-4990 MHz on a non-exclusive basis with a term of 10 years. In response to the consultation, respondents were generally supportive of the proposed licensing regime.

Decision:

The Department will issue non-exclusive spectrum licences with a 10-year term. Annual fees are payable to the Department by March 31, of each year.

6.1.2 Licence Fees

In the consultation, the Department sought comment on a proposed spectrum licence fee for the band 4940-4990 MHz for public safety use. In conjunction with the release of this policy paper, a separate *Canada Gazette* notice will be published that will provide notification of the licence fee, as per the *User Fees Act,* and a further opportunity for public comment.

6.2 Site Licensing

Fixed systems not operating as part of the mobile public safety 4940-4990 MHz system may be licensed for other public safety communication systems, on a secondary basis and at the discretion of the district director. This will allow sufficient flexibility to support a variety of public safety applications. These systems will be licensed on a site-by-site basis using the procedure outlined in Radio Standards Procedure 113, *Application Procedures for Planned Radio Stations above 960 MHz in the Fixed Service* (RSP-113).

7. Technical Considerations

7.1 Radiated Power Limits

The following section specifies the technical requirements for the authorization of public safety systems operating in the band 4940-4990 MHz.

7.1.1 Mobile and Fixed Operations

The transmitting power of stations operating in the band 4940-4990 MHz must not exceed the maximum limits specified below. However all systems should be limited to the power necessary to provide adequate coverage.

7.1.2 Limits for Operation of High-power Devices

Channel Bandwidth (MHz)	High-power Peak Transmitter Power (dBm)
1	20
5	27
10	30
15	31.8
20	33

Devices may use other channel bandwidths, however high-power devices are limited to a peak power spectral density of 21 dBm per 1 MHz. If a directional gain greater than 9 dBi is used, both the peak transmit power and the peak power spectral density should be reduced by the equivalent amount.

For high-power fixed point-to-point and point-to-multipoint operation, a directional gain up to 26 dBi may be used, however if it exceeds 26 dBi, both the peak transmit power and the peak power spectral density should be reduced by the equivalent amount.

7.1.3 Limits for Operation of Low-power Devices

Channel Bandwidth (MHz)	Low-power Peak Transmitter Power (dBm)
1	7
5	14
10	17
15	18.8
20	20

Devices may use other channel bandwidths, however low-power devices are limited to a peak power spectral density of 8 dBm per 1 MHz. If a directional gain greater than 9 dBi is used, both the peak transmit power and the peak power spectral density should be reduced by the equivalent amount.

7.2 Certification of Equipment

All radio equipment must be certified by the Department. The Department will release a Radio Standards Specification (RSS) at a later date to specifically address this issue. Out-of-band emission limits will also be specified.

Decision:

The Department affirms the limits set out in Sections 7.1.2 and 7.1.3 to be the official radiated power limits for the band 4940-4990 MHz.

7.3 Radio Interoperability

Although a number of organizations (e.g. TIA TR8.8 Subcommittee, Project MESA, and Safecom) are currently assessing the requirements for standards for broadband public safety, none have been unanimously adopted and therefore most of the comments received did not recommend the imposition of a specific standard for radio interoperability purposes. It was suggested that the Department allocate spectrum in a technology neutral manner and not require a common/open standard.

The Department recognizes that in order to allow radio interoperability between public safety agencies, consideration must be given to planning and coordination, standards and technology and spectrum requirements. As such, the Department has recently released *Canada Gazette* Notice No. SMSE-005-06 entitled *Consultation Paper on Public Safety Radio Interoperability Guidelines* to propose definitions and a hierarchy of radio interoperability levels as well as suggested guidelines to allow the capability for radio interoperability within bands designated for public safety use.

Decision:

At this time, the Department is not establishing a dedicated channel for radio interoperability nor recommending a specific common/open standard. However, radio interoperability is considered an essential feature for public safety applications and the Department may establish radio interoperability guidelines based on the results of the consultation process initiated by Notice No. SMSE-005-06 entitled *Consultation Paper on Public Safety Radio Interoperability Guidelines*.

The Department requires public safety users to implement systems which are interoperable with all public safety entities so that they can function effectively when an emergency arises. As a result, applicants are required to submit to the Industry Canada district director, a radio interoperability plan which includes agencies operating within their jurisdictional area as well as those in overlapping or adjacent jurisdictional areas. Final determinations as to required licensing conditions pertaining to interoperability will be made by the district director.

The Department will continue to monitor the activities of standards development organizations for a widely adopted broadband public safety standard. A decision will then be made on the applicability of these standards to this band.

7.4 System Coexistence Guidelines

All licensees shall cooperate in the selection and use of channels in order to reduce interference and make effective use of the spectrum. Licensees who experience or cause interference (even though the technical specifications of both this SP and the appropriate RSS are met) are expected to cooperate and jointly resolve issues to ensure equitable access to the spectrum by all operators.

All data and calculations used in the coordination shall be retained by the licensees and be made available to the Department upon request.

When conflicts between systems cannot be resolved, the Department should be advised. Following consultations with the affected parties, the Department will determine the necessary course of action. This may include the imposition of restrictions such as specifying transmitter power, antenna heights, area or hours of operations of the stations involved.

Decision:

The Department affirms the guidelines as set out in Section 7.4 to be the official system coexistence guidelines.

7.5 International Coordination

The use of 4940-4990 MHz is currently covered by Arrangement D of the *Exchange of Notes between the Government of Canada and the Government of the United States of America Concerning the Coordination and Use of Radio Frequencies Above Thirty Megacycles per Second.*[3] The governments of Canada and the United States expect to review the terms of this arrangement to take into account the new allocation and use of the band.

Decision:

The Department affirms that licensees will be required to comply with any future Canada-United States sharing arrangements for the use of the band 4940-4990 MHz.

8. Conditions of Licence for Spectrum Licences

The following conditions of licence apply to licensees for radio frequency spectrum in the band 4940-4990 MHz. Spectrum licences for this band will be issued on a non-exclusive basis. It should be noted that licences are subject to relevant provisions in the *Radiocommunication Act* and the *Radiocommunication Regulations*. For example, the Minister continues to have the power to amend the terms and conditions of spectrum licences (paragraph 5(1)(b) of the *Radiocommunication Act*).

[3] This reference can be found on Industry Canada's Spectrum Management and Telecommunications website at http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf01238.html

8.1 Licence Term

The term of this licence is 10 years. Licensees must pay the annual licence fee before March 31st of each year for the subsequent year (April 1st to March 31 st).

8.2 Eligibility Criteria

Licensees must comply on an ongoing basis with the eligibility criteria in sections 9 and 10 of the *Radiocommunication Regulations*.

Licensees must request the approval of the Minister of Industry for any change that would have a material effect on their eligibility. Such approval must be received in advance of any proposed transactions of which licensees have knowledge. For more information, refer to Client Procedures Circular 2-0-15, *Canadian Ownership and Control* (CPC-2-0-15), as amended from time to time.

8.3 Radio Station Installations

For each radio station, licensees must ensure that: all requirements prescribed in the Client Procedures Circular 2-0-03, *Environmental Process, Radiofrequency Fields and Land-Use Consultation* (CPC-2-0-03), as amended from time to time, are respected; and radio installations are installed and operated in a manner that complies with the requirements of the spectrum utilization policy for this band.

8.4 Provision of Technical Information

When the Department requests technical information on a particular station or on a network, the information must be provided by licensees to the Department according to the definitions and criteria specified by the Department. Refer to CPC-2-1-23, Appendix B - Site Data Elements, for a list of minimal radiocommunication installation data elements required for the Department's technical database.

8.5 Laws, Regulations, and Other Obligations

Licensees are subject to, and must comply with, the *Radiocommunication Act*, the *Radiocommunication Regulations*, the International Telecommunication Union (ITU) *Radio Regulations*, the *Canadian Table of Frequency Allocation*s and the spectrum utilization policy pertaining to this radio frequency band. The licence is issued on condition that the certifications made in the application materials are all true and complete in every respect.

8.6 Technical Considerations

Licensees must comply with the technical requirements set forth in this spectrum utilization policy and must deploy equipment certified under the appropriate RSS. The RSS sets out standards for broadband public safety equipment in the band 4940-4990 MHz.

8.7 International and Domestic Coordination

Licensees must comply with the requirements of cross-border sharing and coordination arrangements established between Canada and the United States, as amended from time to time. While frequency

assignments are not subject to site-by-site licensing, licensees may be required to provide technical data to Industry Canada for given sites. This data may be requested for reasons such as the resolution of coordination conflicts as well as possible interference issues. Should international coordination be required, Industry Canada will identify the appropriate data elements, format and means of submission. Coordination between licensees within Canada will follow similar procedures as those used in international coordination.

Issued under the authority
of the Radiocommunication Act

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