Industry Canada

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Spectrum Management

Spectrum Utilization Policies

General Information Related to Spectrum Utilization and Radio Systems Policies

Note: The definitions of certain system capacities in section 10 of this document are replaced by those found in SP 1-20 GHz.

Canada

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1. Introduction

The purpose of SP-GEN is to consolidate common elements of the various Spectrum Utilization Policies (SP), and Radio Systems Policies (RP) which are published as a series of documents by the Department of Communications.

For many years, the Department has used a public consultation process to establish policies relating to the apportionment of the radio frequency spectrum between different radiocommunications services (spectrum allocation policies), the particular use to be made of an allocated frequency band (spectrum utilization policies) and what types of radio systems will be encouraged in Canada (radio systems policies). The Canadian Table of Frequency Allocations, and the SP and RP series as a whole form the permanent record of these specific policies. As these policies are updated and new policies created, users are encouraged to ensure they are using the latest version of these documents. In many bands, these documents are supplemented by technical standards to ensure the efficient use of the spectrum. SP-GEN applies to those bands and services which are managed by a specific set of policies and standards, i.e. Spectrum Utilization Policies, Radio System Policies and Standard Radio System Plans (SRSP). Other bands and services may have conditions of use not covered by these documents and SP-GEN will not apply.

2. Spectrum Policy Documents

2.1 Spectrum Allocation Policies

The radio frequency spectrum is divided into bands of frequencies which are designated for use by radiocommunications services[1], each of which is given a particular priority of access[2] in various bands. Canadian spectrum allocations are consistent, with a few exceptions, to the International Table of Frequency Allocations[3]. This consistency is maintained because it forms part of Canada's international treaty obligation to prevent harmful radio interference to legitimate users of the spectrum in other countries. The Canadian Table of Frequency Allocations which is updated every few years, contains the domestic allocation of the spectrum resource.

The International Table generally permits a number of different services in each frequency band. The purpose of domestic allocation policy-making is to choose the service or services which best fulfill Canadian radiocommunication needs. As international or Canadian

1 Radiocommunication services are defined in the International Telecommunication Union (ITU) Radio Regulations, Article 1.

2 The radiocommunication services are prioritized by Categories of Service (primary, permitted or secondary) as defined in Article 8 of the ITU Radio Regulations.

3 ITU Radio Regulations, Article 8 contains the International Table of Frequency Allocations.

priorities for the use of the radio spectrum change, so may the domestic spectrum allocation policies. Moreover, on occasion, it is necessary to change particular categories of services (e.g. from primary to secondary) or to remove it from a radio frequency band altogether.

The three categories of services are also defined in the Canadian Table - primary, permitted and secondary services. The Department may grant a radio licence in a frequency band to a service which has a lower category level (e.g. secondary service) than other services sharing the band. The general condition that applies between services is, that a service of a lower category is prohibited from either causing harmful interference to, or claiming protection from harmful interference from, a service with a higher category. The Department will ask that harmful interference by a service of a lower category into a service of higher category be eliminated. Accordingly the Department will normally take no action to mitigate interference from a higher to a lower category of service (see also Section 3.6).

All spectrum allocation changes of significance are subject to full public consultation. New allocation policies are often made public through the spectrum utilization policy (SP) documents. From time to time the Canadian Table of Frequency Allocations is updated and includes these decisions.

2.2 Spectrum Utilization Policies

There are often several uses or applications of a radiocommunication service. Some examples are the broadcasting service (AM, FM, TV etc.), the mobile service (cellular, mobile trunked, mobile paging, etc.), the fixed service (radio-relay, multipoint communications systems). There are also sub-sets of uses of these services such as in the fixed service (radio-relay: digital: high capacity). Spectrum Utilization Policies apply to the more precise use or application of radiocommunications for services in a frequency band. These policies are based on many factors defined by the technology, service needs and the need to achieve more efficient, effective and economic use of the spectrum which enables the development of more specific radiocommunication applications. One objective is the provision of adequate spectrum to match radiocommunications demand. This is often achieved when similar uses are designated in common bands. As a fundamental principle, the Department develops spectrum utilization policies based on type of use of the spectrum rather than by type of user.

2.3 Radio System Policies

Radio system policy guidance is often required to ensure the orderly development of radiocommunications services, to effectively implement existing and emerging new technology or services and to ensure the best utilization of designated spectrum resources. The technical, economic, social, cultural, regulatory (or other) factors influencing a particular service often dictate the amount and choice of the frequency band. The set of factors which finally influence the spectrum utilization policy become an integral part of the Radio System Policy to ensure the implementation and development of a service under the defined objectives and public interest.

3. Application

3.1 Standard Systems

A radio system[4] will be classified as a standard system if it conforms to the most recent issue of the Spectrum Utilization Policy (SP) or the Radio Systems Policy (RP), whichever is applicable (SP/RP), and to the corresponding Standard Radio System Plan (SRSP).

3.2 Non-Standard Systems

A radio system will be classified as a non-standard system and may be licensed accordingly if it does not conform to the most recent issue of the SP/RP or the SRSP for the frequency band in question, or if it is authorized while an SRSP is under preparation.

3.3 General Arrangements

A non-standard (or standard) system may be in the fixed service or in another radio service (e.g. mobile) depending on the uses defined by the SP/RP and SRSP for the applicable frequency band. Non-standard radio systems are subject to **modification or replacement** if their non-standard aspects prevent the establishment of a new system or the expansion of an existing system that is standard. In this eventuality, the parties involved will be encouraged to reach agreement on a satisfactory solution among themselves. Failing such agreement, the Department will consult with the parties involved and determine what modification or replacement of non-standard systems is warranted in the particular circumstances, taking full account of the equipment investments in place, the service requirements of the users, reasonable time frames and any other factor bearing on the matter. Alternatively, it may be necessary that a system which cannot be made standard be **removed** from service to permit the entry of a standard system.

It should be noted that these provisions allow the ongoing and uninterrupted operation of non-standard systems as long as they do not block the entry of a standard system. The need for modification, replacement or removal of non-standard systems will therefore be greater in areas of high radiocommunications demand than it will be in areas of low demand (e.g. some remote areas).

3.4 Five and Two Year Conformance Rule

4 For the purposes of this document, the term "system" will be used in place of "apparatus" as found in the Radiocommuniation Act.

When a system becomes non-standard as a result of a change in an SP/RP or SRSP, a minimum notification period of two years[5] will be given by the Department for any radio system change (modification, replacement or removal) required, and normally no system change will be required in order to permit the establishment of a standard system before five years[5] have elapsed from the date on which the system became non-standard. Where possible, alternative spectrum will be identified if a change in frequency is involved. For those cases where modification, replacement or removal of equipment can be done rapidly and economically, the relevant time periods may be reduced. This procedure for modification, replacement or removal is considered necessary if spectrum management is to effectively advance the use of the spectrum and avoid the constraint of obsolete radiocommunications technology.

In the event the Department is required to alleviate frequency congestion in a frequency band or range of bands in a given geographical area, the Department will not require a licence "application-in-hand" for a standard radio system in order to request the upgrade or removal of non-standard systems in the area. The Regional Executive Director in consultation with the licensee will determine an appropriate time period in which the necessary changes will be made. In cases where the five year[5] protection period has expired, this could be less than two years. Factors to be taken into account in this determination are the period of time for which the system has already been non-standard, the type of use of the system, the upgrade/replacement alternatives, capital investment, service requirements, and the time frame in which the spectrum congestion problem must be alleviated.

3.5 Systems Originally Licensed on a Non-Standard Basis

When a system is originally licensed as a non-standard system, on the basis that it does not meet either the existing SP/RP or SRSP or both, modification, replacement or removal may be required at a later date in order to comply with the SRSP or SP/RP, unless otherwise specified therein. In such cases a two year notice will be given unless, in the opinion of the Regional Executive Director, circumstances warrant a shorter notification period. The five-year protection and 2 year warning rule does not apply to systems originally licensed on a non-standard basis.

5 Unless otherwise specified in the policy for the particular band and service.

3.6 Systems Authorized on a Secondary Basis

When a system has been authorized in a band allocated to a service on a secondary basis and subsequently the frequency is required to support the growth of a service allocated on a primary basis in the same band, the licensee of the secondary system will be required to relinquish its assignment. The non-standard provisions and the 5 and 2 year rule provisions are not applicable. However, the licensee of the secondary system may, at the discretion of the Regional Executive Director and if local circumstances permit, receive up to 2 years notice after which the frequency will be relinquished and made available for use by the primary service.

4. Future Spectrum Policy Changes

Policy changes arise from the need to respond to new demands on the radio spectrum. These can originate in several ways, such as demand for new radio services, introduction of new technologies, changes in the international frequency allocation or use of the spectrum, or simply frequency congestion in an existing band when demand exceeds supply. So as to ensure that Canadians have timely access to new or improved services, or to uphold our international treaty obligations, it may be necessary to implement changes to radio systems before the whole of their useful service life has expired.

The Department is finding that much of the congestion in certain bands is caused by equipment using technology with spectrum efficiencies much lower than is achievable today. This is a result of excessive bandwidths or low encoding efficiency. It is not uncommon to find radio systems in operation as long as 20-25 years. If radio systems based on old and inefficient technologies are not removed or upgraded, new opportunities for the most effective use of the radio spectrum can be blocked, thereby delaying or making its use more expensive than necessary.

To take into account changes to accommodate new demands, users of the radio spectrum should plan their systems such that a normal return on investment is achieved within a reasonable period of time; however, in cases where unforeseen policy changes are required, the applicant should note that the normal 5 and 2 year rule could apply which may render a system subject to change.

5. Special Procedures for the Implementation of New Policies

The Spectrum Utilization Policies and Radio System Policies provide the general policy guidance on spectrum resources and radio system applications for the orderly development of particular radiocommunications services. SRSP documents detail technical

requirements and channelling arrangements for systems for the purpose of efficient spectrum utilization and orderly implementation. Insofar as new spectrum utilization policies make changes to the existing uses of the radio spectrum in certain bands, the existing SRSPs for those bands will have to be modified in various degrees so as to agree with these policies. As a result, in the period until the applicable SRSP can be reviewed and updated, the following special procedures will be used.

Systems licensed in a band in which the SRSP is subject to only minor changes or none at all for the particular usage, as a result of these policies, will be considered for licensing as standard systems if they clearly conform with the SRSP as modified by these policies.

Certain SRSPs are materially affected for a particular usage by new spectrum utilization policies; the Department will consider the licensing of new systems as non-standard systems where in the judgement of the Department it is considered likely that the re-issue of the SRSP at some time in the future will result in making these systems standard. When a new SP is issued and there is no SRSP available, any system licensed would be designated non-standard. In some extreme cases where major revisions in the SRSP may be required and the outcome of these revisions is uncertain (or where no SRSP currently exists for the band), the Department may choose not to license a system at least until a revised SRSP is available. Such uncertainty may occur in bands where there is a broad range of technical options to consider in the formulation of the new SRSP.

Systems operating in accordance with a spectrum utilization policy must take into account the other uses of the radio spectrum which might not be considered by the policy. Radiocommunication services share bands in Canada in accordance with the Canadian Table of Frequency Allocations, as amended from time to time. Unless specifically stated otherwise in departmental publications, radio services may use the spectrum allocated to them in accordance with their allocation status on a "first-come, first-served" basis. Similarly protection to radio systems is in accordance with the status of the radio service (primary, permitted, secondary, or other restrictions) according to the frequency allocation in question in the Canadian Table of Frequency Allocations. The use of the terms "primary and secondary", apply only between services as given in the Table.

6. Spectrum Policies

Certain spectrum utilization policy documents which were issued as a result of the 1-10 GHz policy review in 1982, and some others, contain a specific section (usually 3.2 entitled "Sharing Aspects with Other Services"). As these statements of sharing may not have been revised to reflect later revisions to the Canadian Table of Frequency Allocations, they may be inaccurate. Users are advised to disregard these existing sharing statements. As the

Spectrum Utilization Policies containing such statements are reprinted, these sections will be deleted.

7. Additional Information for Fixed Radio Systems

7.1 Overflow Bands

Consideration has been given to the use of certain bands to solve coordination problems at crossovers or spurs as "overflow" bands and there was considerable public comment on the respective merits of the use of certain bands for this purpose. On reviewing this matter, the Department has concluded that the choice of any overflow band depends on the particular case and should not be predetermined.

7.2 One-hop Systems

A one-hop system is defined as a stand alone single-hop radio link limited to two stations which communicate only with one another. In the past, this has often been described in departmental publications in terms of distance or by the use of the term short-haul. In general, the term "one-hop" will be used in place of short-haul, as applicable. It should be noted that a one-hop spur from a system operating in the same or another band is not considered a one-hop system.

7.3 Diversity and Protection Channels

The term "frequency diversity" refers to the simultaneous transmission of the same traffic over two RF channels operating at different frequencies. Polarization diversity refers to the re-use of the same frequency with a different polarization. Both of these are used to provide equipment redundancy and/or improved propagation reliability. In systems having more than one RF working channel, a similar but lesser form of protection is provided whereby one protection RF channel acts as back-up for several working channels. This is commonly referred to as 1 for N operation, i.e., one protection channel for N working channels. An operating back-up channel for a single working channel is designated "a diversity channel" whereas an operating back-up channel for more than one working channel is designated "a protection channel". A diversity channel will be authorized on a standard basis if the applicant is able to successfully demonstrate that the desired level of reliability cannot be achieved by the use of either or both of the techniques of hot standby and space diversity, as applicable, except in those bands where other conditions are specified.

7.4 Sharing/Protection Considerations

Provision has been made for lower capacity fixed systems in various frequency bands together with higher capacity fixed systems. There has been concern that a lower capacity fixed system operating at minimum capacity could block the growth of higher capacity fixed systems, with a consequent loss in spectrum efficiency. In this and in similar cases, the Department will attempt to maintain frequency or geographic separation between large and small systems by taking into account the anticipated service demands of existing and new users in its assignment practices. In addition, frequency plans will generally designate separate sub-bands for widely differing channel capacity requirements.

8. Numbering of SP Documents

In the SP series of documents, the SP identity number is taken from the lower band edge of the subject band and expressed in gigahertz (GHz), megahertz (MHz) or kilohertz (kHz) as needed to provide a unique identifier. The band edge is expressed in kHz below 27,500 kHz, in GHz above 10 GHz and in MHz between these two frequencies. Where an SP embraces two sub-bands, the number identifies the lower edge of the lower band. For example, the policy documents for bands 6425-6590/6770-6930 MHz and 6590-6770/6930-7125 MHz are designated as SP-6425 MHz and SP-6590 MHz respectively.

9. Definitions

In-plant Video	-	A fixed service for the transmission of industrial or security video signals within the geographic boundary of the premises of the user.
Multipoint Communications Systems (MCS)	-	A fixed service consisting of a central radio station communicating on a (MCS) one or two way basis with two or more associated stations.
Standard System	-	A system which conforms to the most recent issue of the spectrum utilization policy/radio systems policy and to the associated SRSP (see section 3).
Non-standard System	-	A system which does not conform to the most recent issue of the spectrum utilization policy/radio systems policy or the SRSP or which is authorized while an SRSP is under preparation (see section 3).

Subscriber Radio System (SRS)	-	A multipoint communication service normally employed for rural telephone applications.
Studio Transmitter Link (STL)	-	A fixed service for one way transmission between a broadcast studio and a (AM, FM or TV) broadcast transmitter.
Temporary TV Link	-	A fixed service for transmission of a television signal on a temporary basis.
TV Pick-up	-	A fixed service between a temporary remote television camera location and the studio. A TV pick-up may consist of a camera to mobile studio link and a mobile studio to TV broadcast studio link.
Very High Capacity Microwave (VHCM)	-	A fixed service used primarily for the delivery of broadcast programming signals to broadcast receiving undertakings.

10. Definitions of System Capacities

Note: The definitions of system capacities for low capacity (LC), medium capacity (MC), and high capacity (HC) shown in the table below have been revised and are replaced by those found in section 1.9 of SP 1-20 GHz.

Radio Frequency Channel Capacity	Analogue (equivalent voice channels)	Digital[6],[7] [8],[9] (Mbit/s)	
VERY LOW (VLC)	1-24	≤1.544[10]	
LOW (LC)	25-120	≥ 1.544	≤ 18.936
MEDIUM (MC)	121-600	≥ 18.936	≤ 103.68
HIGH (HC)	601-1200	≥ 89.472[11]	
VERY HIGH (VHC)	1201 & up		

6 These limits do not include overhead bits used by the digital radio system which will result in a small increase in transmission bit rate beyond the indicated upper limits in the order of 5% (or possibly more).

7 Applicants must use frequency bands in which the system design channel capacity is met. For example, radio equipment capable of 135 Mbit/s or greater performance must be operated in a HC digital band, even if the initial traffic loading consists of the equivalent of 45 Mbit/s or less.

8 In frequency plans containing more than one channel capacity, new applicants should use the highest capacity channel permissable instead of using more than one lower capacity channel.

9 The table is not intended to imply equivalence between analogue and digital traffic for any given capacity range.

10 Very Low Capacity (VLC) digital capacities may be multiples of the ISDN B and D data rates up to a maximum of 1.544 Mbit/s. The exact multiples will be determined by the RF channel bandwidths and spectrum efficiencies given in each SRSP, subject to the availability of spectrum in the band to support VLC.

11 New HC digital systems exceeding 155.52 Mbit/s in the band 6425-6590/ 6770-6930 MHz are non-standard, and are limited to two RF channels.