Industry Canada Industrie Canada

SP 3-30 GHz
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Spectrum Management and Telecommunications Policy

Spectrum Utilization Policy

Consultation on Revisions to Spectrum Utilization Policies in the 3-30 GHz Frequency Range

Canada

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1.0 Introduction

The purpose of this paper announced in Gazette Notice, DGTP-001-02, is to invite public comments on spectrum policy proposals that address the use of certain bands in the 3-30 GHz frequency range.

In August 1997, the Department released a public consultation paper, entitled *Proposals to Provide New Opportunities for the Use of the Radio Spectrum in the 1-20 GHz Frequency Range* (DGTP-006-97). The document also announced policy decisions which were consequential to certain revisions to the *Canadian Table of Frequency Allocations*.

Since that time, spectrum utilization in the 1-3 GHz range has been addressed in two documents. Comments received in response to DGTP-006-97 were taken into consideration in the development of a spectrum policy entitled *Amendments to the Microwave Spectrum Utilization Policies in the 1-3 GHz Frequency Range* which was announced in Notice DGTP-006-99 in October 1999. This utilization policy made accommodation for more services and applications, and included a transition policy to facilitate the introduction of mobile satellite services. A further consultation paper (DGTP-003-00) was used to develop a spectrum policy entitled *Revisions to the Spectrum Utilization Policy for Services in the Band 2285-2483.5 MHz* (DGTP-03-01). Spectrum was designated for Wireless Communications Services (WCS) and provisions were made to facilitate the introduction of licence-exempt microwave devices in this utilization policy.

There has been interest expressed for the introduction of new services and applications in bands above 3 GHz. In August 1998, Industry Canada announced a spectrum policy, entitled *Spectrum Policy and Licensing Provisions for Fixed Wireless Access Systems in Rural Areas in the Frequency Range 3400-3700 MHz* (DGTP-013-98) which represented the first set of amendments to the 1-20 GHz policies in the spectrum above 3 GHz.

In December 1998, the *Policy Framework for the Provision of Fixed-satellite Services* liberalized many aspects of the provision of fixed-satellite service (FSS) communications in Canada. As a consequence of this liberalization and of other related commitments made in the policy framework, Industry Canada has modified the existing authorization procedures for fixed earth stations and approval of foreign fixed-satellite services. The Department has already approved a number of foreign fixed satellites for use in Canada with some provisions on frequency bands.

A number of changes are occurring in this spectrum range. For example, the requirement for exclusive bands to support heavy route microwave systems in the 4 and 6 GHz range has greatly diminished with the availability of other transport options such as fibre systems. In the 11 and 14 GHz range there is considerable interest in the provision of new broadband access services via geostationary satellites. Similarly, at 18 and 28 GHz, there are plans for multimedia satellite systems to be in operation in the next one-three years. In addition to these requirements, there is a demand for spectrum for new terrestrial wireless access services including licence-exempt applications.

As a result of these and other developments, a review of various aspects of the bands between 3 and 30 GHz is warranted.

2.0 Discussion

The need for broadband access and the provision of advanced telecommunications services to business and consumers continue to grow globally. Telecommunication service providers have been considering wireless solutions for the expansion of existing networks as well as for the implementation of new services. There has also been a new focus on local network distribution or the provision of last-mile connections directly to end users via wireless systems. Wireless technology has continued to advance with more manufacturers taking an interest in developing integrated transmission/switching networks with ATM and Internet Protocol Capability.

2.1 High Density Deployments

Until about five years ago, individual fixed service transmitting stations have typically been authorized on a site-by-site basis. This procedure involves coordination with stations of other systems or services within the band. Where the business case demands ubiquitous deployment on an ongoing basis, this procedure becomes less practicable. The level of interaction required to complete individual site-by-site coordination has a significant impact on the viability of service provision within an area, and can add untenable costs to the service provision particularly where mitigation techniques add complexity to the installation of customer premise equipment. In these circumstances it has become desirable for high density point-to-point and point-to-multipoint implementations to be authorized on the basis of a spectrum block within a geographic area (spectrum-area basis).

In the past five years, the Department has licensed a number of fixed service frequency bands on a spectrum-area basis for high density implementations to provide opportunities for businesses and consumers to benefit from a range of advanced communications access services from a number of carriers. The Department has licensed spectrum at 24 GHz, 28 GHz and 38 GHz for a variety of broadband wireless applications. This spectrum is expected to support short distance, high density, high capacity wireless connections of multiple T-1 channels (x of 1.544 Mb/s) which will most likely first serve businesses and apartment complexes. Some of these systems are being deployed to complement local wireline and fibre distribution networks.

In March 2000, the Department announced the winners of a licensing process for Multipoint Communication Systems (MCS) for fixed services in the band 2500-2596 MHz. This spectrum opened the door for a range of services including high-speed Internet access for consumers and small businesses. Spectrum at 2300 MHz was designated for Wireless Communication Services (WCS) in a recent utilization policy paper dealing with the frequency range 2285-2483.5 MHz (DGTP-003-01). A consultation document (DGRB-006-01) has recently been released for the policy framework to license spectrum at 2300 MHz for WCS and at 3500 MHz for Fixed Wireless Access (FWA). The Department expects that the demand for this spectrum will exceed the available supply in certain areas and that reliance on the marketplace to select licensees will be in the public interest. An auction was therefore selected as the most appropriate licensing process for these two bands.

The Department's *Guidelines on the Licensing Process and Spectrum Release Plan* (DGTP-04-99) identified a number of spectrum and orbital resources which, based on anticipated demand, would require a competitive licensing process. As discussed above, terrestrial services in spectrum licensed under a competitive process typically do not share well with other terrestrial or fixed-satellite services.

A similar situation exists with multimedia systems in the fixed-satellite service (FSS).
As satellites are developed in higher frequency bands, the terminal size and cost are reduced making business opportunities for large scale deployment to small and medium enterprises (SME) and residential markets feasible. As with high density fixed systems, the deployment of high density FSS terminals is on an 'as required' basis. Consequently, coordination with terrestrial services becomes less practicable. A number of paired frequency bands are currently allocated to FSS on an exclusive basis in which high density terminal deployment is feasible without a requirement for coordination with terrestrial radio systems. These bands include portions of the Ku bands at 11.7-12.2 / 14-14.5 GHz and Ka bands at 19.7-20.2 / 29.5-30 GHz.

When some measure of exclusivity of operation by one service is desirable, it does not necessarily entail a requirement for 'hard partitioning' between co-primary allocated services or even type of system in a band. On the contrary, more flexibility is retained with the "soft partitioning" approach which emphasizes the implementation of one service or type of system over another in a particular portion of the band, yet retains the potential for access by either service or system type. For example, while one service may require high density deployments as described above, access by another service in a lower density mode may be managed without undue constraint on the other service. Service rules and operating conditions may also be used to facilitate the implementation of one service or system over another. ***The designation of spectrum within the utilization policies developed for these bands will therefore include consideration of relative deployment densities of systems or services.***

2.2 Low and Medium Capacity Fixed Systems

Low capacity (LC) and medium capacity (MC) point-to-point systems are usually an important part of network deployment, particularly in early stages of development, and for the extension of networks into rural areas. Traditional bands for LC and MC systems have been in the 1-3 GHz spectrum range, where good propagation conditions allow for reliable links over long distances in the order of 50 km. With the recent introduction of new services such as Personal Communications Services (PCS), Multipoint Communications/Distribution Systems (MCS/MDS), Mobile Satellite Services (MSS), Licence-Exempt devices and the resulting transition of fixed systems out of this spectrum, there is increased pressure to find new bands to support LC and MC systems. Plans for the introduction of Third Generation PCS (3G PCS) systems and international developments at 2.3 GHz with the introduction of Digital Audio Radio Satellite (DARS) services have reduced the spectrum available for conventional fixed service systems. It is quite likely, however, that some of these new services will also require low and medium capacity spectrum to support development.

There is currently very little spectrum available in bands below 10 GHz for LC systems. The Department had made some provisions for low capacity systems in the 7 GHz band (7125-7725 MHz), in anticipation that a transition from analogue to digital systems would make more spectrum available. This has not been the case, however, with the spectrum requirements in the 7 GHz band increasing in many areas.

Another aspect is the flexibility of current microwave radio equipment to provide scalable transmission capacities. It has become increasingly easy to expand system capacity as the network grows, upgrading from low to medium to high capacity traffic in an orderly progression. There are obvious advantages in terms of infrastructure to being able to grow within the same spectrum range.

For these reasons, this document will include proposals in many cases to allow for the accommodation of all capacities within the same band.

The current definition of traffic load for low capacity systems includes bit rates between 1.544 Mb/s (T-1) and 24.704 Mb/s (16 T-1). **The Department seeks comments on the suitability of including traffic rates of less than 1.544 Mb/s in the definition of low capacity systems for microwave bands above 1 GHz.**

2.3 Fixed-Satellite Service

Certain frequency band and geostationary satellite orbit (GSO) position combinations have been made available to Canada for fixed-satellite service networks and broadcasting-satellite networks as a result of international agreements and arrangements. In the discussions that follow, reference to the fixed-satellite service bands are the following:

"conventional bands"
- 'C' band 3.7-4.2 // 5.925-6.425 GHz, and
- 'Ku' band 11.7-12.2 // 14.0-14.5 GHz

"extended conventional band"
- 'Ku' band 11.45-11.7 // 13.75-14.0 GHz

"allotment" bands
- 'C' band 4.5-4.8 // 6.725-7.025 GHz, and
- 'Ku' band 10.7-10.95 , 11.2-11.45 // 12.75-13.25 GHz.

There is also the
- 'Ka' band 19.7-20.2 // 29.5-30 GHz (multimedia service links)
- 'Ka' band 18.3-18.8 // 28.35-28.6 and 29.25-29.5 GHz (multimedia feeder links)

Other FSS bands are available in Canada, but without international arrangements governing the use of the GSO.

For the purpose of discussion in the following sections, feeder links (gateway) operations in the fixed-satellite service are defined as those operations that are primarily intended to interconnect networks. Service links are defined as those intended to originate or terminate traffic at user terminals.

Canada has four prime orbital positions as part of the Trilateral Agreement between Canada, the United States (U.S.) and Mexico to develop and operate FSS service in all regions of Canada, the North American market and beyond. These orbital positions are 107.3°W, 111.1°W, 114.9°W and 118.7°W longitude for FSS in the conventional C and Ku bands. The orbital positions at 107.3°W, 111.1°W and 118.7°W have been authorized for a new series of Anik F satellites. The orbital position at 114.9°W remains available for a new satellite in the C and Ku bands. Also, as part of the ITU agreement under Appendix 30B, Canada has been allocated the orbital positions 107.3°W, 111.1°W and 114.7°W to develop FSS in the allotment C and Ku bands.

Canada also has ITU filings for four orbital positions to develop and operate multimedia Ka band FSS service at 91°W, 107.3°W, 111.1°W and 118.7°W longitude. The Department granted approval for two proposed Ka band multimedia satellites at 91°W and 111.1° W to use the service to customer (service link) bands 19.7-20.2 GHz and 29.5-30.0 GHz, and to develop feeder link/gateway operations using the bands 18.3-18.8 GHz, 28.35-28.6 GHz and 29.25-29.5 GHz. The frequency bands align with recent designations by the U.S. Federal Communications Commission (FCC) to accommodate GSO multimedia FSS in the Ka band.

Canada opened its fixed-satellite services market for international telecommunications in December 1998. Full competition in the services for domestic (Canada-Canada) and Canada-U.S. markets was opened in March 2000. The liberalization of communications satellite services is an important component of the WTO agreement in advancing international telecommunications. Canada has met and exceeded its commitments to the WTO which include modernizing its licensing policies dealing with fixed-satellite services.

With the recent changes made to the *Telecommunications Act*, earth stations operated as telecommunications carrier transmission facilities are exempt from the Canadian ownership and control requirements. Also, receive-only earth stations can be licence exempt. Since the opening of this satellite service market, the Department has included more than 40 foreign satellites on its list of approved FSS satellites.

The Department notes that in the process to designate spectrum for Ka band services in the U.S. and Europe, the trend is to provide some measure of exclusivity for both FS and FSS services, as the demand evolves to smaller terminals. There is a need for ubiquitous deployment of terminals with minimal coordination requirements.

This consultation will address both fixed service and fixed-satellite service including the conventional and allotment bands. Views will be sought on the service requirements, congested spectrum areas especially for small very small aperture terminal (VSAT) and consumer terminal operation in urban areas and other issues.

2.3.1 Canadian Domestic Footnote C16A

The authorization of domestic and foreign satellites to offer service in Canada (on the list of approved FSS satellites) is based on meeting, among other things, the national requirements for spectrum allocations and utilization policies. Traditionally, authorization of FSS for domestic and Canada-U.S. traffic has been in the conventional C and Ku bands, although some foreign satellites providing international overseas traffic have included part of the extended conventional Ku bands for a limited number of gateways providing access to the Canadian market. To date, the Department has authorized more than 40 foreign satellites under its list of approved FSS satellites. The Department has fully opened the market to these satellites in the conventional C and Ku bands (3700-4200 / 5925-6425 MHz and 11.45-12.2 / 13.75-14.5 GHz) where spectrum policies for fixed service (FS) and FSS have been elaborated. The Department has restricted the operation of these satellites to large antennas, outside cities, in the allotment C and Ku bands (4500-4800/6725-7025 MHz and 10.7-11.7/12.75-13.25 GHz). The list of approved FSS satellites (available at: http://strategis.ic.gc.ca/pics/sf/listfss-1.pdf) outlines this situation in note 1 for allotment bands. In December 2000, the Department issued revisions to the Canadian Table of Frequency Allocations adopting a domestic footnote C16A[1], emphasising that customer service links would not be licensed in any of these bands prior to a public consultation which will consider the spectrum interests of all parties.

The text reflects the current practice by the Department in authorizing fixed-satellite service (FSS) applications in these bands. FSS satellites in these bands have to share the spectrum with fixed services (FS) and, in some cases, with an extensive number of fixed systems. Particular spectrum sharing requirements may be needed, especially for multipoint-fixed systems to evolve in urban areas.

Given that a number of considerations are being assessed in these bands with domestic and foreign satellite operators for non-Geostationary (NGSO) as well as GSO operations, the Department believes it was prudent in C16A to describe the present situation. The Department has received several letters of concern from FSS interests that it was foreclosing the full development of satellite service. It was not the intention of the Department to prejudge the outcome of future consultation in stating that the present practice be followed until the completion of such a consultation.

2.3.2 Domestic Coordination Considerations

The Department notes the FCC Notice of Proposed Rule Making (FCC 00-369) treating a request for a ruling to require partial-band licensing of earth stations in the fixed-satellite service in bands shared on a primary basis with the terrestrial fixed service. In the United States, earth stations are coordinated and licensed for the entire allocated frequency band and for all azimuth directions pointing to visible

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[1] **C16A (CAN-00)** The use of spectrum for fixed-satellite services in the bands 4500-4800 MHz, 10.7-11.45 GHz and 17.8-19.7 GHz in the space-to-Earth direction and 6725-7025 MHz, 12.75-13.25 GHz, and 28.35-29.5 GHz in the Earth-to-space direction is presently limited to large antenna earth stations located in areas outside of urban centres. Domestic implementation of fixed-satellite services in these bands will be governed by spectrum utilization policies which will be formulated in the future. These policies will consider existing services, ITU Radio Regulations and operating criteria for sharing between services and systems.

locations on the geostationary orbital arc (full-band, full-arc basis). This is intended to provide the earth station operator the flexibility to protect communications with any approved satellites on the orbital arc and any transponder frequencies in the full band in order to meet operational requirements. The proposal made in the Notice of Proposed Rule Making (NPRM) would "require an FSS earth station that has been licensed to operate in C or Ku band shared frequencies for 24 months or longer to demonstrate, in response to the denial of a request of an FS applicant to coordinate spectrum, that the FSS earth station denying coordination is using, has recently used, or has imminent plans to use the requested spectrum. If the FSS earth station licensee cannot make such a demonstration during the coordination, then the FS station may be successfully coordinated and the FSS earth station must not cause unacceptable interference to, nor is it protected from interference from, the FS station on that spectrum in the future." This is intended to improve the efficient use of spectrum by both FS and FSS.

In Canada, while the initial coordination contour for the earth station with respect to fixed service stations is developed on a full-band, full-arc basis, the Department protects only the assigned frequency and direction for the earth station. Coordination is typically carried out directly between a new applicant and the licence holder.

The Department will seek comments later in this consultation paper on the suitability of adopting similar spectrum sharing arrangements as in the FCC proposal in these bands.

2.4 Priority Use

The Spectrum Policy Framework document outlines spectrum uses which will be granted high priority and support in the access and use of the radio spectrum. These priority uses include radiocommunication systems vital to sovereignty, national security and defence, law enforcement, public safety and emergency services. Recent tragic events have demonstrated the need for high-quality communications capabilities to assist public safety and disaster relief agencies in performing their tasks. Current statements of existing requirements for public safety applications tie the effectiveness of such operations to mobile communications. Future looking requirements are aimed at taking advantage of emerging technologies to enhance public safety operations. Examples include the implementation of advanced communications capabilities such as video transmission and broadband data to mobile platforms.

The emphasis for these requirements tends to focus on bands below 3 GHz, however, for future services the Department considers that there may be an opportunity to facilitate access to spectrum by systems which support piority use applications in bands above 3 GHz . **While no specific proposals are made in this document, comment is sought on possible opportunities to improve priority use communications capabilities and access to spectrum in the frequency range 3-30 GHz.**

2.5 Structure of Issues Raised for Consultation

The consultation has been organized to follow the fixed-satellite service nomenclatures for the bands C, Ku and Ka in order to facilitate treatment of common issues between the fixed service and the fixed-satellite service. Comment will still be requested on a band-by-band basis to deal with considerations which are unique to each spectrum range.

Consultation on additional items specific to the fixed service, including new spectrum for licence-exempt devices and the introduction of Intelligent Transport Systems will be treated separately throughout the document.

3.0 The C Band

The bands between 3700 MHz - 7025 MHz are generally referred to as the C bands; the bands 3.7- 4.2 GHz and 5.925-6.425 GHz are the **conventional** C bands; and 4.5-4.8 GHz and 6.725-7.025 GHz are the **allotment** C bands.

3.1 Fixed-Satellite Service

In Canada, the predominant use by the FSS in the C band is in the conventional rather than the allotment portions of the band. Over the past 30 years, the orbital arc from 70E- 140EW longitude has been populated by conventional C band satellites to serve markets in the Americas. As discussed previously, the WTO agreement has introduced competition in fixed-satellite market, and foreign fixed-satellite stations are being approved for use in Canada.

While the number of earth stations may increase as a result of satellite-service growth, the Department is not aware of any move toward higher-power satellites or the use of spot beams at C band which would facilitate the entry of earth stations using smaller antennas. The combination of low frequency band and 2° satellite orbit spacing is likely to keep earth station antenna sizes relatively large in comparison with services in higher frequency bands (Ku and future Ka bands) targeted to serve business and consumers directly with broadband access and VSAT networks. It is therefore anticipated that coordination of these FSS systems with the FS applications proposed for this spectrum will remain feasible.

The Department has received a request from Telesat to consider a transition of the conventional C band allocation from co-primary FS and FSS to a primary designation for fixed satellite. It was indicated that the exclusive operation by FSS in the C band would improve the economics of satellite services. The request emphasises the requirement to connect rural and remote communities with medium to high capacity transport links for Internet service where such access cannot be provided by terrestrial means. This would suggest that the satellite terminals would be located in areas where terrestrial services are not likely to appear. Consideration could also be given to segregation between fixed and fixed-satellite services in either mutually exclusive geographic area or for mutually exclusive portions of the frequency band. It should be noted that receive-only earth stations are presently exempt from licensing and that all fixed earth stations are exempt from Canadian ownership and control requirements under the *Telecommunications Act*.

As discussed in section 2.3.1, the Department has allowed use of spectrum beyond the conventional bands in the extended conventional bands and allotment bands. Operations using satellites in the allotment bands have been restricted to large antennas located outside urban areas as described in domestic footnote C16A. The footnote indicates that customer service links would not be licensed in any of these bands prior to a public consultation which will consider the interests of all parties. For example, the feeder link gateways for Globalstar Canada operating in the bands 5091-5250 MHz and 6875-7055 MHz are located in Smiths Falls, Ontario and Rocky Mountain House, Alberta, away from

urban centres. Similarly, Inmarsat has been given authorization for operation in the extended conventional C band for the gateway at Weir near Lachute, Quebec. Having received strong representation from the satellite industry that satellite service (or earth station deployment) should not be limited in the allotment bands, the Department notes that there are three Canadian orbital positions (107.3EW, 111.1EW and 114.9EW longitude) allotted by the ITU for which these C bands can be used. Input will be requested under the individual bands as to whether opening the allotment bands for use in Canada on a coordinated first-come-first-served basis with the fixed service would stimulate the development of these orbital positions and advance satellite service competition (Canadian and foreign satellites).

3.2 Fixed Service

Until the mid 1990s, the 3700-4200 MHz (Lower 4 GHz) and 5915-6425 MHz (Lower 6 GHz) bands were used for high capacity, point-to-point microwave systems, with certain cross-sections also using the bands 3500-3700 MHz and 4540-4900 MHz (Upper 4 GHz). These systems formed part of the backbone of our telecommunications network, handling intercity voice, data and video traffic. As a consequence, the Department had ensured over the years that this spectrum was available for heavy-route long haul microwave systems with certain traffic growth requirements. During the last decade, telecommunication companies have developed extensive intercity fibre optic facilities which carry most of the traffic once found on the heavy-route microwave systems. Fibre transmission capacity has surpassed microwave capacity by several folds, to the point where microwave links are used only in cases where difficult terrain or access problems prohibit fibre, or as emergency backup systems. With the introduction of competition, it was anticipated that new entrants would be interested in developing new heavy route microwave network backbones. However, this has not occurred. As a result, a number of microwave systems in these bands have been decommissioned and there has been little growth in either new systems or expansion of existing systems. The requirement for exclusive bands to support heavy route cross sections has greatly diminished with the advent of a number of intercity fibre optic systems.

As discussed in section 2.2, the introduction of new mobile and wireless access services in bands below 3 GHz has made it necessary to designate more spectrum for low and medium capacity transmission rates. There are also strong arguments for allowing scalable growth within the same band as microwave systems progress from low to medium and high capacity traffic requirements. There is also a demand for spectrum to support new wireless access applications (point-to-multipoint systems). The *Spectrum Policy and Licensing Provisions for Fixed Wireless Access Systems in Rural Areas in the Frequency Range 3400-3700 MHz* (DGTP-013-98) designated the band 3400-3700 MHz for fixed wireless access systems. Provisions for sharing the band 3500-3700 MHz are being reviewed in the consultation document for the policy and licensing framework for fixed wireless access services in the band 3400-3700 MHz. (DGRB-06-01 http://strategis.ic.gc.ca/pics/sf/wcs2300fwa3500.pdf).

3.2.1 Conventional C bands 3700-4200 MHz and 5925-6425 MHz

The fixed service and fixed-satellite service (space-to-Earth) share the band 3700-4200 MHz on a co-primary basis. The fixed service and fixed-satellite service (Earth-to-space) share the band 5925-6425 MHz on a co-primary basis.

The Department seeks comments on the following issues, potential directions and public interest:

(i) whether to migrate the conventional C band from co-primary FS and FSS to a primary designation for fixed-satellite service (discussed in section 3.1);

(ii) whether to consider segregation between fixed and fixed-satellite services in either mutually exclusive geographic areas, or for mutually exclusive portions of the frequency bands (discussed in section 3.1);

(iii) whether to designate additional low capacity and medium capacity spectrum for fixed service in either or both bands and to remove the traffic growth requirements in all or part of each band in order to facilitate new fixed service applications (discussed in section 3.2); and

(iv) whether to consider coordination requirements similar to the FCC proposal for partial-band licensing of earth stations in the fixed-satellite service in bands shared on a primary basis with the terrestrial-fixed service (discussed in section 2.3.2).

3.2.2 Allotment C bands 4500-4800 MHz and 6725-7075 MHz

The fixed service and fixed-satellite service (space-to-Earth) share the band 4500-4800 MHz on a primary basis. Fixed service use in the bands 4545-4705 and 4735-4895 MHz is limited to high capacity systems. The bands 4460-4540 MHz and 4900-4990 MHz are restricted to use by the Government of Canada. The fixed service and fixed-satellite service (Earth-to-space) share the band 6425-7075 MHz on a primary basis. Fixed service use in the band 6425-6930 MHz includes medium and high capacity systems and studio transmitter links (STL).

Canada has three orbital positions (107.3°W, 111.1°W and 114.9°W longitude) available for which the allotment C bands can be used. Domestic footnote C16A presently limits the use of spectrum for fixed-satellite services in the bands 4500-4800 MHz and 6725-7075 MHz to large antenna earth stations located in areas outside of urban centres. It is noted that in the U.S., footnote US245 limits the use of 4500-4800 MHz to international intercontinental systems (meaning a few large antennas), since this band is used by the military.

The Department seeks comments on the following issues, potential directions and the public interest:

(i) to provide full flexibility for the deployment of fixed-satellite service earth stations in the allotment C bands in Canada on a coordinated first-come, first-served basis with the fixed service in order to stimulate the development of the available Canadian orbital positions and advance competition in satellite offerings, or to retain the application of domestic footnote C16A for FSS in the bands;

(ii) whether to designate additional low capacity spectrum for fixed service in all or part of the band 6425-6930 MHz;

(iii) whether to designate additional low capacity and medium capacity spectrum for fixed service and to remove the traffic growth requirements in the band 4500-4800 MHz in order to facilitate new fixed-service applications;

OR

whether to add a mobile service allocation to the band 4500-4800 MHz, with fixed and mobile services restricted to use by the Government of Canada (see section 3.2.3 below); and

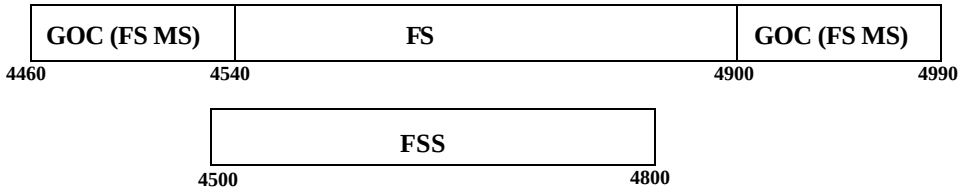
(iv) based on the response to item (iii), whether to consider coordination requirements similar to the approach described in the FCC proposal for partial-band licensing of earth stations in the fixed-satellite service in bands shared on a primary basis with the terrestrial-fixed service discussed in section 2.3.2.

3.2.3 Additional Proposal 4400-4990 MHz

The Department notes that in the U.S., the band 4400-4990 is allocated to the Federal Government for fixed and mobile services. U.S. footnote US245 limits FSS use of the band 4500-4800 MHz to international intercontinental systems. The band 4940-4990 MHz became non-Federal Government exclusive in 1999 and has been proposed for wireless communication services. Some interest has been expressed in the U.S. for using spectrum in this range for public safety applications. In Europe, the band 4400-4990 MHz is a harmonized military band for fixed and mobile services, and FSS in the band 4500-4800 MHz is not allowed in European NATO countries.

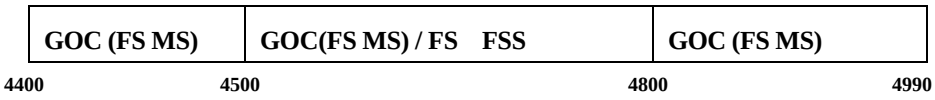
In Canada, the bands 4460-4540 MHz and 4900-4990 MHz fixed and mobile services are restricted to use by the Government of Canada. The fixed service use in the bands 4545-4705 and 4735-4895 MHz is limited to high capacity systems and subject to traffic growth requirements.

Current Designations



The Department proposes to realign the designation of the spectrum restricted to use by the Government of Canada to the bands 4400-4500 MHz and 4800-4990 MHz. Based on the response to this proposal and those described in the previous section, the Department will consider the realignment of the service use in the band 4500-4800 MHz. No specific change is proposed at this time for the addition of wireless communications services to the band 4940-4990 MHz.

Proposal



Comments are invited.

4.0 The Ku band

The Ku-band refers to frequencies within the bands between 10.7 GHz - 14.5 GHz. The **conventional** bands are 11.45-12.2 GHz, and 13.75-14.5 GHz. The **allotment** bands are 10.7-10.95 GHz, 11.2-11.45 GHz, and 12.75-13.25 GHz.

4.1 Fixed-Satellite Service

In Canada, the predominant use by the FSS in the Ku band is in the exclusive 11.7-12.2 / 14-14.5 GHz portions of the conventional band. As discussed previously, the WTO agreement has introduced competition in the fixed-satellite market and foreign fixed-satellite stations are being approved for use in Canada. The Department notes that there are seven filings in the U.S. for global Non-Geostationary (NGSO) FSS systems. It is anticipated that direct to subscriber applications within the Ku bands will continue to grow. One of the key aspects that has facilitated access directly to business is the small size of antenna required at these frequencies. In Canada, the bands 11.7-12.7 GHz and 13.75-14.5 GHz are exclusively for satellite services, however, there are two bands 10.7-11.7 GHz and 12.7-13.25 GHz (described in sections 4.2.2 and 4.2.3 respectively) which have a significant number of fixed systems. It is anticipated that coordination of these FSS systems with the FS applications proposed for this spectrum will be difficult.

As discussed in section 2.3.1, the Department has allowed use of spectrum beyond the conventional Ku bands in the extended conventional and allotment Ku bands. Operations using satellites in the bands 10.7-11.45 GHz and 12.7-13.25 GHz have been restricted to large antennas mostly located outside urban areas in accordance with domestic footnote C16A, which emphasises that customer service links would not be licensed in any of these bands prior to a public consultation which will consider the interests of all spectrum users. Having received strong representation from the satellite industry that fixed satellites or earth station deployment should not be limited in these bands, the Department notes that Canada has three orbital positions (107.3EW, 111.1EW and 114.9EW longitude) available for which the allotment Ku bands can be used. Input will be requested under the individual bands as to whether opening the allotment bands for wide deployment of earth stations in Canada on a coordinated first-come-first-served basis with the fixed service would stimulate the development of these orbital positions.

Two-way messaging and position tracking satellite systems (mobile satellite applications) currently operate in North America on a secondary basis using fixed satellite capacity in the bands 11.7-12.2 GHz (space-Earth) and 14.0-14.5 GHz (Earth-space). While these systems are designed to use GSO FSS, the introduction of NGSO FSS may increase the level of unavailability of these mobile satellite applications.

4.2 Fixed Service

The band 10.7-11.7 GHz is used by low, medium and high capacity digital line-of-sight radio systems in the fixed service. Typical deployments of microwave systems include single and multi-hop point-to-point configurations. These systems are authorized on a site-by-site and frequency-by-frequency basis.

The band 12.7-13.25 GHz is used by Very High Capacity Microwave (VHCM) point-to-multipoint, TV studio to transmitter links and TV pickup. The majority of these fixed microwave systems carry a number of analogue vestigial-sideband amplitude-modulated television signals on consecutive radio channels spaced 6 MHz apart. Typical implementations use the entire band to deliver a cable program package in a star configuration from a main cable head-end to cable distribution points in adjacent towns and communities. VHCM systems also provide cable TV feeds to distribution points within large cable television (CATV) systems. While these systems are authorized on a site-by-site and frequency-by-frequency basis, the level deployment of systems in this band can be considered as high density. However, in recent years with the wide deployment of fibre and coaxial CATV networks, a number of links in many VHCM systems have been decommissioned.

4.3 10.7-11.7 GHz

The fixed service and fixed-satellite service (space-to-Earth) share the band on a primary basis.

In the U.S., footnote NG104 limits 10.7-11.7 GSO FSS to international systems, and the band has been identified in two proceedings as a future home for FS point-to-point systems to be relocated from the 2 GHz band. A further Order (FCC-00-418) limits the implementation of NGSO FSS to gateway/feeder link operations, which have been carefully defined to exclude service links directly to customer premises.

The 1995 SP 1-20 GHz microwave spectrum policy made provision for low capacity systems to have access to spectrum in the band 10.95-11.45 GHz, limited to a maximum of 80 MHz (40 MHz in each direction). It was brought to the attention of the Department during the preparation of SRSP 310.7 that the provision for low capacity systems in the sub-bands 11.12-11.2 GHz and 11.62-11.7 GHz was preferable since it allowed pairing to occur in channels already designated for medium and high capacities. Comments were solicited on this proposal in the subsequent consultation in 1997 entitled *Proposals to Provide New Opportunities for the Use of the Radio Spectrum in the 1-20 GHz Range* (DGTP-006-97).

Based on the results of that consultation and regarding the potential use of FSS in these bands, the Department is making the following policy provision for the fixed service:
***Low and very low capacity systems have access to the bands 11.115-11.195 GHz and 11.605-11.685 GHz*.**

The Department seeks comments on the following issues, potential directions and the public interest:

(i) whether to provide full flexibility for the deployment of fixed-satellite service earth stations in the band 10.7-11.7 GHz on a coordinated first-come-first-served basis with the fixed service in order to stimulate the development of the available Canadian orbital positions and advance competition in satellite offerings or to retain the domestic footnote C16A for FSS in the band and extend its application to the entire band 10.7-11.7 GHz;

(ii) whether to consider coordination requirements similar to the approach described in the FCC proposal for partial-band licensing of earth stations in the fixed-satellite service in bands shared on a primary basis with the terrestrial-fixed service discussed in section 2.3.2; and

(iii) whether there is any action that could or should be taken regarding MSS use of FSS transmissions for two-way messaging and position tracking satellite systems.

4.4 12.7-13.25 GHz

The fixed service and fixed-satellite service (Earth-to-space) share the band on a primary basis. The current utilization policy in SP1-20 GHz limits the use of the band by FSS systems to implementations which do not constrain the use of the band by very high capacity microwave (VHCM) systems used in conjunction with CATV systems.

The Department seeks comments on the following issues, potential directions and the public interest:

(i) whether to provide full flexibility for the deployment of fixed-satellite service earth stations in the band 12.7-13.25 GHz in Canada on a coordinated first-come, first-served basis with the fixed service (point-to-multipoint) in order to stimulate the development of the available Canadian orbital positions and advance competition in satellite offerings or to retain the application of domestic footnote C16A for FSS in the band; and

(ii) whether to consider coordination requirements similar to the approach described in the FCC proposal for partial-band licensing of earth stations in the fixed-satellite service in bands shared on a primary basis with the terrestrial-fixed service discussed in section 2.3.2.

The Department also solicits comments on:

(i) the types of point-to-multipoint fixed system deployments which will continue to use the spectrum in the band 12.7-13.25 GHz; and

(ii) the kind of new point-to-multipoint applications which are envisaged for this band, for example, could this spectrum provide broadband wireless access or wireless cable distribution to the home.

5.0 The Ka Band

The Ka band herein refers to frequencies within the bands between 17.7 GHz - 20.2 GHz (space-to-Earth) and 27.5-30.0 GHz (Earth-to-space).

With current proposals for the offering of Ka band satellite services soon in the bands 17.7-20.2 GHz, and 27.5-30.0 GHz, the Department will be seeking comments on the final structure of the spectrum, taking into account the potential differences in sharing environments with the various service applications in the band. As outlined in section 9.2, the Department has already authorized a number of Ka band multimedia GSO satellites.

5.1 Fixed-Satellite Service in the Ka Band

In Canada, the Ka band satellite spectrum includes the bands 17.7-20.2 GHz and 27.5-30.0 GHz. The bands 19.7-20.2 GHz and 29.5-30.0 GHz are designated on an exclusive and primary basis to fixed-satellite services. This spectrum was allocated at the World Administrative Radiocommunication Conference 92 (WARC-92), with the objective to develop multimedia consumer access satellite services. In the band 17.7-19.7 GHz, the FSS has a co-primary allocation with the fixed service and shares access to the spectrum with fixed systems authorized in accordance with SP 1-20 GHz. As described in section 9.2.1, there are currently a number of fixed services in the band 17.7-19.7 GHz.

In the band 27.5-29.5 GHz, the FSS has a co-primary allocation with the fixed service. Access to the band 27.5-28.35 GHz is in accordance with the spectrum utilization policy for Local Multipoint Communications System (LMCS) services and domestic footnote C47A which limits FSS to applications which will pose minimal constraints on the deployment of FS systems.

As discussed in section 2, the Department has been very active in authorizing future Canadian geostationary Ka band multimedia satellites (*i.e.*, 91°W and 111.1°W longitude) which will deploy a range of customer services in the bands 19.7-20.2 / 29.5-30 GHz and use associated spectrum for feeder link/gateways in the bands 18.3-18.8 GHz, 28.35-28.6 GHz and 29.25-29.5 GHz. These gateways are expected to be relatively few in number (in the order of 6-10 gateways per satellite to serve North America) and capable of being located in areas which will minimize constraints on the deployment of fixed service systems. The spectrum aligns in part with recent decisions by the FCC to facilitate FSS access to the Ka band spectrum. The Department has also recently initiated a call for satellite applications in the 107.3°W longitude orbital position.

Licensing of satellites in the bands 17.8-19.7 GHz and 28.35-29.5 GHz has been guided by domestic footnote C16A on spectrum for feeder links/gateways until a future public consultation.

There are a number of spectrum policy decisions required to implement fixed-satellite services in the Ka bands including NGSO satellite and feeder links for mobile satellite services.

5.1.1 Geostationary Fixed Satellite

Geostationary FSS systems have the potential to provide universal Internet access, two-way high-speed data communications, video conferencing, interactive multimedia, voice, data and video services within their coverage area. The licensing activity thus far in Canada has been to authorize geostationary fixed satellites which promises to bring high-speed Internet to Canadians in all regions of Canada, including Northern Canada.

5.1.2 Non-Geostationary Fixed Satellite

At WRC-95, spectrum for FSS employing non-geostationary (NGSO) satellites was identified in the bands 18.8-19.3 GHz (space-to-Earth) and 28.6-29.1 GHz (Earth-to-space) under the provisions of Resolution 118 (WRC-95). NGSO FSS systems have global applications employing a large number of low-Earth orbiting (LEO) satellites which promise to provide a variety of voice, data and video services directly to business customers and potentially to consumers. WRC-97 subsequently confirmed the criteria for the use of this band.

5.1.3 NGSO Mobile-Satellite Service Feeder Links

The band 19.3-19.7 GHz is allocated for FSS (space-to-Earth) and FS on a co-primary basis. The band 29.1-29.5 GHz is allocated for FSS (Earth-to-space) and FS on a co-primary basis. Use by the FSS is limited to feeder links for NGSO systems in the MSS. At WRC-97, power flux density limits were adopted defining the amount of interference allowed from NGSO MSS feeder links into terrestrial fixed systems (Res. 46). NGSO MSS feeder links use frequencies allocated to the FSS to interconnect a mobile-satellite space station with other fixed communications networks by means of one or more

gateway Earth stations. Based on these provisions, the Iridium MSS satellite constellation was developed and a gateway to interconnect with the PSTN was established in the U.S. to serve the North American market.

5.2 Fixed Services in the Ka Band

5.2.1 Fixed Services in the band 17.7-19.7 GHz

The spectrum utilization policies for fixed services operating in the band 17.7-19.7 GHz include provisions for low, medium and high capacity point-to-point systems, Local MCS, VHCM, TV STL and TV-pickup. These fixed service systems operate according to channelling plans defined in Standard Radio System Plan (SRSP) documents. Currently, there are: some *380* licensed frequency assignments for low, medium and high capacity fixed links licensed in the paired bands 17.7-18.14 GHz and 19.26-19.7 GHz; very few licensed frequencies in the band 18.14-18.58 GHz; *670* licensed frequency assignments for low, medium and high capacity fixed links in the paired bands 18.58-18.82 GHz and 18.92-19.16 GHz; and *80* frequency assignments for MCS fixed links licensed in the paired bands 18.82-18.92 GHz and 19.16-19.26 GHz. In particular, the spectrum designated for Multipoint and VHCM systems has very few licensed frequency assignments and will need to be reconciled with the need for Ka-band multimedia satellite feeder links. These bands are identified in the *Guidelines for Licensing Process and Spectrum Release Plan (RP-020)* as falling under a competitive licensing process, and are currently listed as suspended, pending future competitive processes.

5.2.2 Fixed Service in the Band 27.5-29.5 GHz

The band 25.35-28.35 GHz (28 GHz) is currently designated in Canada for Local Multipoint Communications Systems (LMCS). In October 1996, the Minister of Industry awarded LMCS licenses in the 28 GHz band through a comparative licensing process in the 64 largest urban areas. Spectrum designations for fixed services have not been developed for the remaining band at 28.35-29.5 GHz. In the band 27.5-29.5 GHz, the FSS has a co-primary allocation with the fixed service. Access to the band 27.5-28.35 GHz is in accordance with the spectrum utilization policy for LMCS services and domestic footnote C47A which limits FSS to applications which will pose minimal constraints on the deployment of FS systems.

5.3 Other Administrations 17.7-20.2 GHz

The Department notes that the FCC has developed designations for the band 17.7-19.7 GHz as follows:

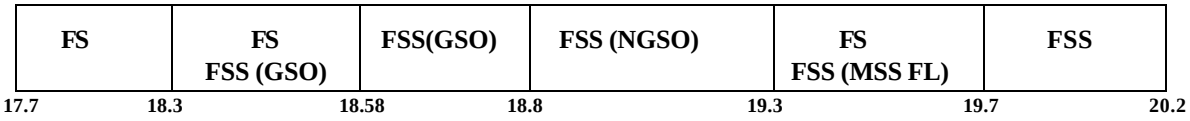
- for the fixed service
  - in the band 17.7-18.3 GHz on a primary exclusive basis
  - in the band 18.3-18.58 GHz on a co-primary basis with GSO/FSS and
  - in the band 19.3-19.7 GHz on a co-primary basis with MSS feeder links;

- for GSO/FSS service
  - in the band 18.58-18.8 GHz on a primary basis
  - in the band18.3-18.58 GHz on a co-primary basis with terrestrial FS;

- for NGSO/FSS service in the band 18.8-19.3 GHz on a primary basis; and

- for MSS feeder links in the band 19.3-19.7 GHz on a co-primary basis with the FS.

FCC Spectrum Designations



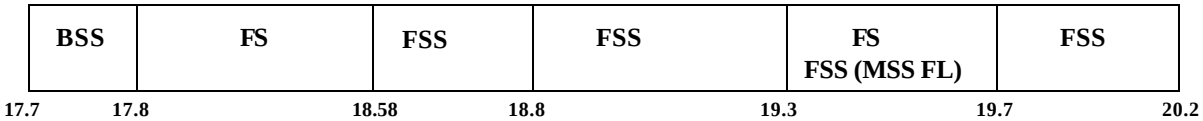
These U.S. domestic designations differentiate between GSO and NGSO implementations of the FSS. The FCC Report and Order for 18 GHz have removed designations for secondary access to the bands while 28 GHz still makes provision for secondary access by other services.

The Department also notes the European Radiocommunications Committee decision ERC/DEC/(00)07 dealing with the shared use of the band 17.7-19.7 GHz by the fixed service and the fixed-satellite service (space-to-Earth). Coordinated use of the band 17.7-19.7 GHz is permitted, however, Decides (1) states that Earth stations in the fixed-satellite service (space-to-Earth), which are not coordinated through a national frequency assignment process, shall not claim protection from stations of the fixed service. This would imply that the decision to implement uncoordinated receiving earth terminals in portions of the band could be made by individual administrations, but that there would be no protection to such terminals on a bilateral basis. While there are proposals to pair this band with spectrum at 28 GHz, the provisions for uncoordinated transmitting earth stations are different in decision ERC/DEC(00)09 discussed in section 12.

These designations do not differentiate between GSO and NGSO implementations of the FSS further than described in international footnotes.

5.4 Proposal 17.7-19.7 GHz

In making this proposal, the Department recognizes the importance of aligning spectrum use within the North American marketplace and the Americas particularly for satellite services. The Department also notes that the U.S. has made specific spectrum designations for each of the services in portions of the 17.7-20.2 GHz range, with no access by other services, even on a secondary basis. The Department wishes to align spectrum designations, but seeks to retain flexibility for all services within the bands. Preliminary input would indicate that the band could be soft partitioned to emphasize the implementation of the particular services highlighted in the table, with access by co-primary services on a more restricted basis.



17.7-17.8 GHz

No change is proposed to the status of services in this band. This band is allocated for broadcast satellite service (BSS) after April 1, 2007 and is currently used for feeder links for the BSS operating in the band 12.2-12.7 GHz. When BSS service is implemented in the 17 GHz band, feeder links will be accommodated in the 25 GHz band (see Canadian domestic footnotes C45 and C47).

17.8-18.58 GHz

It is proposed that emphasis be placed on a designation for FS in this band. Sharing with low density FSS use (such as gateways) on a coordinated basis is deemed to be feasible. The use of spectrum for fixed-satellite services in the band 17.8-18.58 GHz will continue to be limited to large antenna earth stations located in areas outside of urban centres in accordance with Canadian footnote C16A. This allows the continuation of FS implementation within two of the current four FS band plans in the 17.7-19.7 GHz range. The major portion of the current pairing of 17.7-18.14/19.26-19.7 GHz and the MCS band at 18.14-18.58 would remain intact. It should be noted that 17.7-17.8 GHz is paired with 19.26-19.36 GHz resulting in minimal impact of BSS and NGSO-FSS. A possible structure for fixed services would be to pair 17.8-18.2 GHz with 19.3-19.7 GHz leaving 18.2-18.58 GHz open for MCS applications.

18.58-18.8 GHz

It is proposed that emphasis be placed on a designation for FSS systems in this band. This will eventually facilitate the deployment of ubiquitous, uncoordinated earth terminals which could be licensed on an area basis. It is noted that sharing between FSS and the Earth Exploration Satellite (passive) systems in the 18.6-18.8 GHz band has been proven difficult. WRC-00 adopted power flux density (pfd) levels that facilitate the implementation of FSS in the band.

18.8-19.3 GHz

It is proposed that this emphasis be placed on a designation for FSS systems in this band. This will facilitate the deployment of ubiquitous, uncoordinated earth terminals which could be licensed on a spectrum and area basis.

19.3-19.7 GHz

It is proposed that emphasis be placed on a designation for FS in this band. Sharing with low density FSS (MSS feeder links) on a coordinated basis is deemed to be feasible. The use of spectrum for fixed-satellite services in the band 19.3-19.7 GHz will continue to be limited to large antenna earth stations located in areas outside of urban centres in accordance with Canadian footnote C16A.

19.7-20.2 GHz

FSS remains unaffected by this proposal. This band is to support the development of multimedia fixed-satellite services to consumers.

In the context of the above proposals, for each of the sub-bands and services, the Department is seeking comments on the following:

(a) the level of exclusivity which may be required for each portion of the bands for particular services as proposed above, as well as on the continued access by other services, *i.e.*, partitioning of portions of the spectrum required?;

(b) the requirement, if any, for a moratorium on the licensing of new terrestrial fixed services in portions of the band, taking into account the time frames for implementation of satellite service in the bands;

(c) in addition to international regulations, is it necessary to develop domestic rules for the implementation of FSS systems and eventually FSS NGSO systems in these bands or portions of these bands?;

(d) is there a need to distinguish between FSS service links (consumer access) for NGSO and GSO systems in the context of access to portions of the bands?

(e) is there a need to distinguish between FSS feeder links for NGSO and GSO systems in the context of access to portions of the bands?

There are a number of domestic footnotes related to the bands discussed above which may require modification to reflect policy decisions made with respect to the proposals described above. These footnotes are included in Annex A. **Comments on these footnotes are requested in light of the responses submitted to this section.**

5.5 27.5-30.0 GHz

The band 27.5-29.5 GHz is allocated to the fixed service on a primary basis. The band 27.5-30.0 GHz is allocated to the fixed-satellite service (Earth-to-space) on a primary basis. Noting that the spectrum for FSS is paired with FSS (space-to-Earth) spectrum at 17.7-20.2 GHz, consideration should be given to where similar sharing conditions exist.

5.6 Other Administrations 27.5-30 GHz

The Department notes that the FCC has developed designations for the band 27.5-29.5 GHz as follows:

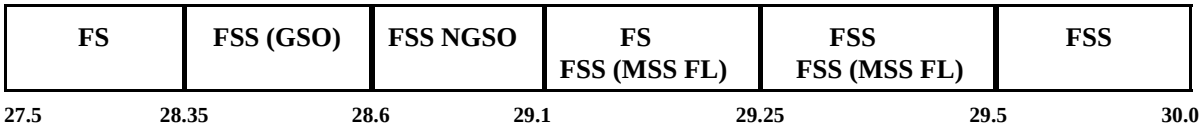
- for the fixed service
  - in the band 27.5-28.35 GHz on a primary basis,
  - in the band 29.15-29.25 GHz on a co-primary basis with MSS feeder links;

- for GSO/FSS service
  - in the band 28.35-28.6 GHz on a primary basis,
  - in the band 29.25-29.5 GHz on a co-primary basis with MSS feeder links;

- for NGSO/FSS service in the band 28.6-29.1 GHz on a primary basis;

- for MSS feeder links
  - in the band 29.1-29.25 GHz on a co-primary basis with FS, and
  - in the band 29.25-29.5 GHz on a co-primary basis with GSO FSS.

FCC Spectrum Designations

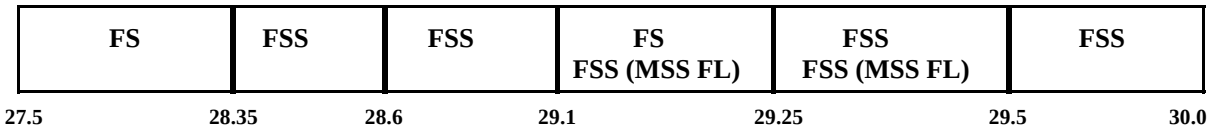


These U.S. domestic designations differentiate between GSO and NGSO implementations of the FSS. The FCC Report and Order for 28 GHz also still make provision for secondary access by other services to the designations while at 18 GHz secondary access has been removed.

The Department also notes the European Radiocommunications Committee decision ERC/DEC/(00)09 dealing with the use of the band 27.5-29.5 GHz by the fixed service and the fixed-satellite service (Earth-to-space). This decision identifies priority bands for FS and uncoordinated FSS Earth stations; however, coordinated use of the entire band 27.5-29.5 GHz by the FSS is permitted. Frequency bands are also identified where FS use can be defined in geographical areas with FSS having access to the band outside those areas. While there are proposals to pair this band with spectrum at 18 GHz, there are no provisions for priority bands for uncoordinated receiving earth stations at 18 GHz in decision ERC/DEC(00)07 discussed in section 9. These designations do not differentiate between GSO and NGSO implementations of the FSS further than described in international footnotes.

5.7 Proposal 27.5-30 GHz

Preliminary input would indicate that the band could be soft partitioned to emphasize the implementation of the services highlighted in the table, with access by co-primary services on a more restricted basis.



27.5-28.35 GHz

No changes are proposed to the spectrum utilization policy decisions which have already been made for this band. This band is currently designated for LMCS in the fixed service. Access to this spectrum by fixed-satellite earth stations is limited to applications which will pose minimal constraints upon the deployment of fixed service systems, such as a small number of large antennas for feeder links,

in accordance with Canadian Table of Frequency Allocations, domestic footnote C47A[2].

28.35-28.6 GHz

It is proposed that emphasis be placed on a designation for FSS systems in this band. This will facilitate the deployment of ubiquitous, uncoordinated earth terminals which could be licensed on an area basis.

28.6-29.1 GHz

It is proposed that this emphasis be placed on a designation for FSS systems in this band. This will facilitate the deployment of ubiquitous, uncoordinated earth terminals which could be licensed on an area basis.

29.1-29.25 GHz

It is proposed that emphasis be placed on a designation for FS in this band. Sharing with low density FSS (MSS feeder links) on a coordinated basis is deemed to be feasible. The use of spectrum for fixed-satellite services in the band 29.1-29.25 GHz will continue to be limited to large antenna earth stations located in areas outside of urban centres in accordance with Canadian footnote C16A. This proposal designates this band for LMCS type of services, noting that in the U.S., LMDS services and operations within this band are limited to hub-to-subscriber transmissions due to the sharing with MSS feeder links. *[Licensing of systems within this band would be the subject of a separate consultation document addressing LMCS.]*

29.25-29.5 GHz

It is proposed that emphasis be placed on a designation for FSS in this band, including feeder links for MSS systems.

29.5-30 GHz

FSS remains unaffected by this proposal. This band is to support the development of multimedia fixed-satellite services to consumers.

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[2] **C47A (CAN-00)** The band 27.35-28.35 GHz is being licensed for Local Multipoint Communication Systems (LMCS) in the fixed service, which will be given priority over fixed-satellite service systems sharing this spectrum on a co-primary basis. Fixed-satellite service implementation in this band will be limited to applications which will pose minimal constraints upon the deployment of fixed service systems, such as a small number of large antennas for feeder links.

In the context of the above proposals, for each of the sub-bands and services, the Department is seeking comments on the following:

(a) the level of exclusivity which may be required for each portion of the bands for particular services as proposed above, as well as, on the continued access by other services, *i.e.*, partitioning of portions of the spectrum required;

(b) the requirement, if any, for a moratorium on the licensing of new terrestrial fixed services in portions of the band, taking into account the time frames for implementation of satellite service in the bands;

(c) in addition to the international regulations, is it necessary to develop domestic rules for the implementation FSS systems and eventually NGSO FSS systems in these bands or portions of these bands?;

(d) is there a need to distinguish between FSS service links (consumer access) for NGSO and GSO systems in the context of access to portions of the bands? and

(e) is there a need to distinguish between FSS feeder links for NGSO and GSO systems in the context of access to portions of the bands?

There are a number of domestic footnotes related to the bands discussed above which may require modification to reflect policy decisions made with respect to the proposals described above. These footnotes are included in Annex A. **Comments on these footnotes are requested in light of the responses submitted to this section.**

6.0 Intelligent Transportation Systems in the Band 5850-5925 MHz

Intelligent Transport Systems (ITS) consist of a series of diverse technologies for communication, information processing and control which is intended to improve the safety and efficiency of transportation infrastructures. In general, ITS services are also expected to decrease traffic congestion, facilitate the reduction of air pollution and help conserve vital fossil fuels. Initiatives for the development of ITS architectures are in progress in the U.S., Europe and Japan.

In June 2000, the Canadian ITS Steering Committee released its report on the Architecture Framework for ITS, which establishes the architecture for the evolution of ITS for Canada. There are a number of service components for ITS including Dedicated Short Range Communications (DSRC) systems intended to provide short range wireless links to transfer information between vehicles and roadside systems. Examples of such information transfer include: traffic light control, traffic monitoring, travellers' alerts, automatic toll collection, traffic congestion detection, emergency vehicle signal preemption of traffic lights and electronic inspection of moving trucks through data transmissions with roadside inspection facilities. Accommodation for DSRC systems has been made in the 902-928 MHz band; however, it is anticipated that there will be a requirement for additional spectrum in the near future.

The ITS community, which includes Transport Canada and provincial transportation authorities, has shown through various studies that this band, 5850-5925 MHz, is ideally suited for DSRC operations given its compatibility with U.S., European and Asian developments, the availability of radio technology, signal propagation characteristics (frequency reuse distances), and the available spectrum capacity.

In Canada, the band 5850-5925 MHz is allocated on a primary basis to Fixed Services, Fixed-Satellite Service (Earth-to-space) links and on a secondary basis to Amateur and Radiolocation services. The band 5725-5875 MHz is also allocated for industrial, scientific and medical "ISM" applications and licence-exempt devices.

The band 5850-5915 MHz (LL6) is designated for use by low and medium capacity fixed systems while the band 5915-6425 MHz (L6) is allocated to high capacity fixed systems. Presently, there are approximately 550 fixed system frequency assignments in the band 5850-5915 MHz. These systems are predominantly used for LC/MC overlay on the heavy route L6 systems for major cellular route expansion. Another 75 frequency assignments made in accordance with the channel plan for the L6 band 5915-6425 MHz overlap the 5915-5925 MHz portion of the proposed band for ITS.

In the U.S., the band 5850-5925 MHz is currently allocated on a co-primary basis for the Government's Radio Location Service (*i.e.*, for use by high-powered military radar systems) and for non-Government FSS uplink operations. ISM devices and unlicensed Part 15 devices are also permitted to operate in the 5725-5875 MHz segment. In a recent decision, October 1999, the FCC allocated 75 MHz of spectrum in the band 5850-5925 MHz specifically for DSRC-based ITS systems. Licensed use in the U.S. will depend on the Radio Location systems and this may not totally align with the Canadian incumbents' use, so harmonization will be required.

Some applications of ITS will be suitable for licensing, both, to benefit from the protection afforded to licensed systems and to facilitate coordination with incumbent services in the band. Other applications will be more suited to licence-exempt operation. Work is underway to identify a possible harmonized standard for ITS systems. When such a standard is adopted, many of the outstanding questions will have more complete answers, but some principles will be stated here which would facilitate the introduction of these new services.

It is anticipated that eventually the entire band will be required for ITS applications, but the rate at which that happens and the time frame in which incumbent services are impacted can be greatly improved by careful selection of characteristics of the ITS equipment and applications. For example, the majority of the incumbent microwave systems in Canada are in channels located in the spectrum between 5875-5883 MHz and 5908-5925 MHz. Applications suited to licensing could be located in this spectrum and coordinated with incumbent fixed microwave systems. As well, noting that this may not align perfectly with U.S. radiolocation requirements for licensed applications, ITS systems which are sufficiently agile to be capable of selective operation throughout the band would reduce the requirement for precise alignment of spectrum available for licensed and licence-exempt operation.

Recognizing the importance of safety and efficiency to Canada's transportation infrastructure, the Department is proposing to designate 75 MHz of spectrum for ITS systems in the band 5850-5925 MHz.

Comments are requested on the following:

(a) whether there is a requirement to add a mobile allocation to the band 5850-5925 MHz to accommodate ITS applications;

(b) options available to minimize the impact on existing microwave users in the band; and

(c) the requirement, if any, for a moratorium on the licensing of new fixed systems in portions of the band, taking into account the time frames for implementation of ITS service in the bands.

7.0 Services in the 8 GHz Frequency Range

The 7725-8275 MHz band is designated for medium and high capacity fixed service microwave systems. The band 7900-8275 MHz is shared with FSS (Earth-to-space), limited to the Government of Canada (GoC) and used by the Department of National Defence for a small number of earth stations.

The Department is proposing to add a low capacity designation to this band. Comments are solicited on whether the designation for low capacity should be made throughout the band or be limited to a portion of the band, *e.g.*, 80+80 MHz.

Comments are also requested on the types of systems and their deployments which will continue to use the spectrum and new applications which are expected to require access to spectrum in this range.

The 8275-8500 MHz band is designated for low and medium capacity fixed service video systems. The band 8275-8400 MHz is shared with FSS (Earth-to-space) limited to GoC use.

Comments are requested on the types of systems and their deployments which will continue to use the spectrum, as well as, potential new applications which could be accommodated in this band.

8.0 Licence-Exempt Applications

There has been a lot of interest in licence-exempt applications in the 900 MHz, 2.4 GHz and 5 GHz bands which are shared with ISM applications. In October 1999, the Department released the *Spectrum Utilization Policy for Licence-Exempt Wireless Local Area Networks in the 5 GHz Range*. The Department designated the bands 5150-5250, 5250-5350 and 5725-5825 MHz for wireless LE-LAN systems which, by definition, can be characterized as local transmission devices available to provide a wide range of applications for high-speed broadband digital distribution applications including voice, video and data. The key objective of the policy was to provide sufficient spectrum for new LE-LAN devices which would provide greater choice of access and distribution technologies to service providers and users.

The next World Radiocommunication Conference in 2003 will consider regulatory provisions and spectrum requirements for new and additional allocations to the mobile, fixed, Earth exploration-satellite and space research services, and review the status of the radiolocation service in the frequency range 5 150-5 725 MHz under its agenda Item 1.5. There is some support for consideration in the band 5470-5725 MHz to allow indoor and outdoor wireless access system operation with minimal operational and/or technical constraints while protecting the existing services. Work is underway in the Conference Preparatory Committee to develop Canadian proposals.

The Department is interested in determining the general need and opportunities for spectrum to support new licence-exempt devices and systems in bands below 10 GHz.

The Department seeks comments on the following issues, potential directions and the public interest:

(a) whether more spectrum should be made available for LE applications recognizing that high power LE applications may constrain other services;

(b) whether there is spectrum where LE applications could be designated;

(c) the amount of spectrum which would be required; and

(d) the types of applications which could be accommodated.

8.1 Licence-Exempt Applications at 57 GHz

In January 2001, the Department announced the release of a spectrum utilization policy (Gazette Notice, DGTP-001-01) for the introduction of new licence-exempt wireless devices in the frequency bands 46.7-46.9 GHz, 57-64 GHz and 76-77 GHz. The band 59-64 GHz was designated for use by licence-exempt devices to accommodate a variety of short range high capacity wireless communication devices for the delivery of multimedia applications.

In the consultation which preceded the release of the utilization policy, the Department solicited comments on proposals for the bands 57-59 GHz and 64-66 GHz. At the time, most respondents preferred to defer comments on technical rules, future services and applications for these bands. Based on the response to the consultation, the Department deferred decisions on the introduction of LE devices in the 57-59 GHz band. Since that time the FCC has adopted technical rules for the use of the band 57-59 GHz by unlicensed devices, and the Department has received representation from the Radio Advisory Board of Canada to adopt a similar designation and technical rules. The Department also notes that several European administrations have adopted technical rules and channel plans for the band for licensed applications. While the use of the band by licence-exempt devices does not necessarily preclude the introduction of licensed services, it may make sharing difficult.

Recognizing the value of harmonizing spectrum use with other countries particularly for applications which involve consumer devices, the Department proposes to adopt a designation in the band 57-59 GHz for use by licence-exempt devices on the basis that such devices cannot claim protection from other radio systems and services. As a baseline, the Department proposes to establish technical requirements which align with those adopted by the FCC for the operation of such devices. **Comments are requested on these proposals.**

8.2 Licence-Exempt Applications at 90 GHz

The Department is aware that the FCC is considering making spectrum available at 90 GHz on a licensed and/or licence-exempt basis for high data rate last-mile applications. The FCC 's Office of Engineering and Technology held a forum last year to obtain feedback on potential commercial uses of the band 92-95 GHz. It is anticipated that this spectrum will provide good transmission range for very high capacity last-mile access applications and computer to computer communications.

The Department seeks comments on the following issues, potential directions and the public interest:

(a) the type of applications which will require access to this spectrum and the time frame for that requirement;

(b) the amount of spectrum which would be required; and

(c) whether portions of the spectrum should be made available on a licensed basis rather than a licence-exempt basis.

8.3 TV Pickups and Airborne TV Pickups

In October 1999, Industry Canada released a Spectrum Utilization Policy, entitled *Amendments to the Microwave Spectrum Policies in the 1-3 GHz Frequency Range* (SP 1-3 GHz) in which it designated the band 2025-2110 MHz, on a shared geographical basis, for TV-pickups and point-to-point fixed systems.

The need for TV-pickup operations from airborne platforms transmitting to receivers on the ground was identified. It is anticipated that coexistence with the fixed service systems will be difficult due to the large area over which these systems are expected to operate.

The Department seeks comments on the following issues, potential directions and the public interest:

(a) whether there is suitable additional spectrum available for these applications, such as the existing video distribution band at 8275-8500 MHz;

(b) whether airborne TV pick-up applications can be introduced into the current TV pick-up band 6930-7125 MHz; and

(c) whether these applications should be shared with LE devices as they operate on a temporary basis.

9.0 24.05-24.25 GHz

This band is currently allocated to Radio Location Services on a primary basis and to the Amateur service and Earth Exploration-Satellite service (active) on a secondary basis. The FCC has formally approved the use of Safety Warning Systems in the band 24.05-24.25 GHz on a secondary basis. These systems alert drivers as far as a mile away that they are approaching road hazards such as railroad crossings, stopped school buses, utility crews, road constructions and traffic accidents.

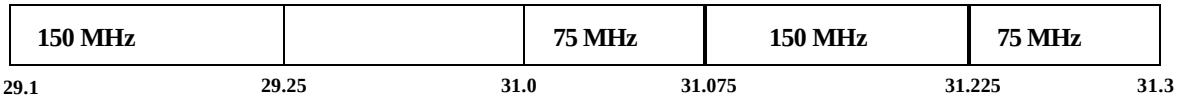
With a view toward designating the band 24.05-24.25 GHz to Safety Warning Systems on a secondary basis, the Department requests comments on the level of interest in the provision of these systems in Canada, as well as any other potential uses that would increase the flexibility of this band.

10.0 31.0-31.3 GHz

This band is allocated to mobile and fixed services on a primary basis. The United States has designated this band as available for LMDS services and has divided the spectrum into sub-band pairings.

The Department proposes to designate the band 31.0-31.3 GHz for LMCS. It is further proposed to structure the band to pair the centre 150 MHz with the spectrum at 29.1-29.25 GHz and pair the two 75 MHz blocks at either end.

(Note: licensing of systems within this band would be the subject of a separate consultation document)



The Department is seeking views on this proposal.

11.0 31.8-33.4 GHz

At WRC-97, a number of frequency bands above 30 GHz were identified through Resolution 726 as available for the deployment of high density fixed systems. Included in Resolution 726 was the frequency range 31.8-33.4 GHz. WRC-97 amended the table of frequency allocations to include the fixed service on a primary basis in the 31.8-33.4 GHz range subject to conditions found in Resolution 126. The first condition stipulated that this allocation to the fixed service would not go into force until 1 January 2001. Secondly, this allocation would be reviewed at WRC-2000 taking into account the results of sharing studies and the future requirements of the other allocated services. The frequency range 31.8-33.4 GHz also has primary allocations to the radionavigation, space research (space-to-Earth) (deep space) and the inter-satellite services. WRC-00 dealt with the allocation to the FS at 31.8-33.4 GHz, and as a result, the band was identified as available for HDFS in footnote S5.547.

It is noted that since the conference, the ITU-R has developed internationally harmonized channel plans for the band 31.8-33.4 GHz. To date, the focus has been on the introduction of channel plans for systems intended to be used to back haul traffic in support of the newly licensed 3G PCS bands.

The Department will issue separately a proposal to incorporate WRC-2000 allocation decisions in the domestic Table of Frequency Allocations.

This band is one of very few bands allocated internationally and in all regions which the fixed service does not share on a co-primary basis with the fixed-satellite service. It would therefore be well suited for high density fixed service (HDFS) applications including both point-to-point and point-to-multipoint configurations. It is generally accepted that it is preferable for HDFS implementations to have access to spectrum blocks within a geographic service area rather than site by site authorization. This band would therefore fit the general rule for situations where the Department foresees using a competitive licensing process (where there is, or could be excess spectrum demand relative to supply). These situations are discussed in the *Guidelines on the Licensing Process and Spectrum Release Plan (RP-020)*. The Guideline document also provides a forecast of certain types of spectrum resources to be released, as well as the anticipated time of release.

With the premise that the domestic allocation is made, the Department is proposing that the spectrum 31.8-33.4 GHz be designated for fixed services, for a future licensing process. **Comment is requested on this proposal.**

Comment is also requested on:

- the anticipated time frame in which this spectrum would be required;
- possible applications which would make use of this spectrum;
- the time frame for equipment availability in the band.

12.0 Implementation

It is suggested that applicants contact the nearest district office of Industry Canada regarding radio licensing in the bands covered in this policy document. General inquiries about the policy provisions contained in this document may be addressed to the Spectrum and Orbit Policy Directorate, Telecommunications Policy Branch, 300 Slater Street, Ottawa, Ontario, K1A 0C8 (Phone: 613-998-4470/3974) (Fax: 613-952-0567).

Issued under the authority
of the Radiocommunication Act

Michael Helm
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Annex A

In the call for applications for the geostationary orbit position at 118.7 degrees, the Department indicated that a footnote would be incorporated in the *Canadian Table of Allocations* to indicate a preference for paired bands for the FSS. The footnote, in addition to footnote C16A, would also indicate the bands to be used for service links and the bands to be limited for feeder links/gateways as follows:

CXX **(CAN-01)** Geostationary orbit fixed satellites (GSO FSS) providing multimedia service to customers (service links) in the bands 19.7-20.2 GHz and 29.5-30.0 GHz will use spectrum for feeder link (gateways) in the bands 18.3-18.8 GHz (space-to-Earth), 28.35-28.6 GHz (Earth-to-space) and 29.25-29.5 GHz (Earth-to-space).

C16A **(CAN-00)** The use of spectrum for fixed-satellite services in the bands 4500-4800 MHz, 10.7-11.45 GHz and 17.8-19.7 GHz in the space-to-Earth direction and 6725-7025 MHz, 12.75-13.25 GHz, and 28.35-29.5 GHz in the Earth-to-space direction, is presently limited to large antenna earth stations located in areas outside of urban centres. Domestic implementation of fixed-satellite services in these bands will be governed by spectrum utilization policies which will be formulated in the future. These policies will consider existing services, ITU Radio Regulations and operating criteria for sharing between services and systems.

C43 **(CAN-94)** In the bands 17.3-17.8 GHz and 17.9-18.4 GHz the fixed-satellite service (Earth-to-space) is limited to feeder links to broadcasting-satellite space stations operating in the 12.2-12.7 GHz band (See C47).

C45 **(CAN-94)** In the band 17.7-17.8 GHz Canadian stations in the fixed service shall not claim protection from and shall not cause harmful interference to Canadian domestic stations operating in the broadcasting-satellite service after 1 April 2007. In addition, to protect broadcasting-satellite receiving stations in Canada and in the United States, the aggregate power flux density from fixed systems of one country shall not be greater than -109 dB (W/m2) over any 1 MHz band in any area within the other country where the broadcasting-satellite service is used.

C47 **(CAN-94)** Feeder links to broadcasting-satellite systems operating in the 12.2-12.7 GHz band are limited to the band 17.3-17.8 GHz, unless it is necessary to use another band because of the operation or planned operation of a (down link) broadcasting-satellite system in the 17.3-17.8 GHz band. The choice of which feeder-link band to use shall take into account the planned lifetime of the associated space-station. If for the above reason the band 17.3-17.8 GHz is not available, either the band 17.9-18.4 GHz or the band 24.75-25.25 GHz shall be used. The choice between these latter two bands should take into account the need to coordinate the band 17.9-18.4 GHz with other primary services, and the need to use the band 24.75-25.25 GHz for the provision of feeder links to broadcasting-satellite systems operating in the band 17.3-17.8 GHz.