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Spectrum Management and Telecommunications Policy

Spectrum Utilization Policy

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

As amended by: Notice No. DGTP-013-09 — **Decision
Regarding Spectrum Utilization Policy for the 11 GHz
Band**

Department of Industry

Radiocommunication Act

Notice No. DGTP-008-04 - Revisions to Spectrum Utilization Policies in the 3-30 GHz Frequency Range and Further Consultation

This Notice announces the publication of a document on revisions to the spectrum utilization policies for services in certain bands in the frequency range 3-30 GHz, including revisions to the *Canadian Table of Frequency Allocations* adopted on a provisional basis. The document also initiates further consultation on proposals for policy revisions for services in certain bands in the frequency range 3-95 GHz.

In 2002, the department launched a broad consultation with proposals to introduce new services and system applications in a number of bands as well as to reconcile the spectrum use of fixed and fixed-satellite services in shared bands. This was in response to a number of changes in technology and the Canadian telecommunications infrastructure, as well as new opportunities in this spectrum range. Among the interests is the provision of new broadband services using multimedia satellite and new terrestrial wireless access including license-exempt applications.

The spectrum utilization policies established in this document are based on the extensive public comment received in response to the consultation of 2002 as well as broad discussion with industry. The decisions focus on increasing flexibility of service offerings for both fixed and fixed-satellite services, recognizing the importance of harmonizing spectrum use in a North American market, particularly for satellite services and commercial consumer devices.

Invitation to Comment

Provisional Changes

In the policy document, Industry Canada has adopted a few allocation changes on a provisional basis. In the absence of compelling arguments to the contrary, these changes will be adopted in the *Canadian Table of Frequency Allocations*. The Department invites interested parties to provide their views and comments by November 2, 2004 regarding these provisional changes.

Further Consultation

Industry Canada raises a number of issues in the frequency range 3-95 GHz for public comment. The Department invites interested parties to provide their views and comments by January 14, 2005 for the items of further consultation.

Shortly after the close of the comment period, all comments received will be posted on Industry Canada's [Spectrum Management and Telecommunications web site](http://www.gc.ca/spectrum) at <http://www.gc.ca/spectrum>.

Submitting Comments

Respondents are requested to provide their [comments](#) in electronic format (WordPerfect, Microsoft Word, Adobe PDF or ASCII TXT) to the following e-mail address: wireless@ic.gc.ca, along with a note specifying the software, version number and operating system used.

Written submissions should be addressed to the Director of Spectrum and Radio Services, Industry Canada, Room 1611A, 300 Slater Street, Ottawa, Ontario, K1A 0C8.

All submissions should cite the *Canada Gazette*, Part I, the publication date, the title, and the notice reference number (DGTP-008-04).

Obtaining Copies

Copies of this notice and documents referred to are available electronically on the Spectrum Management and Telecommunications Web site at <http://www.gc.ca/spectrum>.

Official printed copies of gazette notices can be obtained at the [Canada Gazette web site](http://www.gazette.gc.ca/rp-pr/p1/index-eng.html) at <http://www.gazette.gc.ca/rp-pr/p1/index-eng.html> or by calling the sales counter of Canadian Government Publishing at (613) 941-5995 or 1-800-635-7943.

October 1, 2004

Larry Shaw
Director General
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Contents

1.0	Introduction.....	1
2.0	Issues Regarding the Use of Fixed-Satellite Services.....	2
3.0	Decisions on Spectrum Utilization Policies for C Band.....	3
3.1	Conventional Paired Bands 3700-4200 MHz and 5925-6425 MHz.....	3
3.2	Allotment Paired Bands 4500-4800 MHz and 6725-7075 MHz for FSS.....	7
3.3	Intelligent Transportation Systems in the Band 5850-5925 MHz.....	11
3.4	Further Consultation.....	13
3.5	8 GHz Band - Addition of Low-Capacity Fixed Service.....	14
4.0	The Ku Band.....	16
4.1	Background.....	16
4.2	10.7-11.7 GHz.....	16
4.3	12.7-13.25 GHz.....	18
4.4	Two-way Messaging and Position Tracking.....	20
4.5	13.75-14.0 GHz.....	21
5.0	The Ka Band.....	22
5.1	Background.....	22
5.2	17.7-20.2 GHz.....	23
5.3	27.5-30.0 GHz.....	34
6.0	Additional Issues.....	42
6.1	Very Low-capacity (VLC).....	42
6.2	Domestic Coordination Considerations.....	42
6.3	Licence-exempt Applications Below 10 GHz.....	43
6.4	Further Consultation.....	44
6.5	Licence-exempt Applications Above 10 GHz.....	46
6.6	TV Pick ups and Airborne TV Pick ups.....	51
6.7	31.8-33.4 GHz.....	52
6.8	Footnote C44 24.75-25.225 GHz.....	53
6.9	Review of Broadband Spectrum Cap Applicable to the Bands 24, 28, and 38 GHz.....	54
7.0	Consequential Changes to the Canadian Table of Frequency Allocations.....	56
7.1	Changes to the Band 4500-4990 MHz.....	57
7.2	Changes to the Band 5850-7075 MHz.....	58
7.3	Changes to the Band 10.7-13.25 GHz.....	59
7.4	Changes to the Band 13.75-14.0 GHz.....	60
7.5	Changes to the Band 17.8-19.7 GHz.....	62
7.6	Changes to the Band 27.5-29.5 GHz.....	64
	Appendix A - Definitions of Short Forms and Acronyms Referred to in SP 3-30 GHz.....	65

1.0 Introduction

The purpose of this paper announced in Gazette Notice, DGTP-008-04, is to make revisions to spectrum utilization policies in certain bands in the 3-30 GHz frequency range. Also, a number of new spectrum issues are being raised in this document for public comment.

In January 2002, the Department released a public consultation paper, entitled *Consultation on Revisions to the Spectrum Utilization Policies 3-30 GHz Frequency Range* (DGTP-001-02). The proposals made in that document were in response to a number of expressions of interest for the introduction of new services and applications in the spectrum above 3 GHz.

The previous consultation applicable to such a broad range of spectrum, services and applications was conducted in August 1997, with the release of a paper entitled *Proposals to Provide New Opportunities for the Use of the Radio Spectrum in the 1-20 GHz Frequency Range* (DGTP-006-97). 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 additional services and new radio applications, and included a transition policy to facilitate the introduction of mobile-satellite services at 2 GHz. 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 Frequency Range 2285-2483.5 MHz* (DGTP-003-01). 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, Radio Systems Policy 008, *Policy Framework for the Provision of Fixed-satellite Services* (RP-008) 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-satellite 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 ranges 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 products and applications.

As a result of these and other developments, a review of various aspects of the bands between 3 and 30 GHz was warranted. Thirty-seven independent submissions were made in response to the consultation, expressing a range of opinions on each of the proposals made in the document. These comments have been taken into account.

The spectrum utilization policy decisions that address the use of certain bands in the 3-30 GHz frequency range are detailed in this document. Provisions are made which are intended to maximize the economical use of the spectrum while minimizing the impact of one use on another, in accordance with the revised Spectrum Policy Framework.

2.0 Issues Regarding the Use of Fixed-Satellite Services

In the majority of proposals made in the consultation for the bands shared between the fixed service (FS) and the fixed-satellite service, the concept of “soft partitioning” was to be applied in situations where it was desirable to place emphasis on the use of the spectrum by one service over another. In this fashion, access to the spectrum would not be denied, but would be limited to implementations that would not constrain the development of the service for which priority would be given. This was intended to facilitate the implementation of applications or services where the deployment of terminals would occur in a ubiquitous manner, with minimal burden of coordination and the possibility of authorization on a spectrum and geographic area basis. In the comments, there was considerable support for soft partitioning of the spectrum including the element of designating priority to fixed service or fixed-satellite service as appropriate, with limitations not to constrain the development of the service granted priority in the band.

As discussed in the consultation document, Canadian domestic footnote C16A¹ was intended to apply to bands shared between fixed and fixed-satellite services where no domestic spectrum utilization policies to govern the use of either one or both of the services had been developed. In considering the 3-30 GHz range in the consultation document the process to develop such spectrum utilization policies was initiated. It follows that in the subsequent spectrum policies developed as a result of the consultation it will be necessary to modify the application, nature and content of C16A (as well as other footnotes) to be applied to the various bands in order to clearly enunciate the intended policy provisions.

With respect to texts for footnote C16A, there was objection to the use of ‘limited to large antenna earth stations located in areas outside of urban centres’ to describe the limitations to be placed on the implementation of FSS earth terminals. Several different proposals were made for replacement text. These will be considered in the discussions of individual band decisions.

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.

Action: Appropriate revisions to footnote C16A will be developed in this paper to reflect the spectrum utilization policy decisions in each of the relevant C, Ku and Ka band sections.

3.0 Decisions on Spectrum Utilization Policies for C Band

The bands between 3700 and 7025 MHz are generally referred to as the C bands; the bands 3700-4200 MHz and 5925-6425 MHz are the **conventional** C bands; and 4500-4800 MHz and 6725-7025 MHz are the **allotment** C bands.

3.1 Conventional Paired Bands 3700-4200 MHz and 5925-6425 MHz

3.1.1 Background

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. Coordination is carried out on a first-come, first-served basis.

Over the past 30 years, the orbital arc from 70°-140°W longitude has been populated by conventional C band satellites to serve markets in the Americas. 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 World Trade Organization (WTO) agreement in advancing competition in provision of telecommunications services. With the 1998 changes made to the *Telecommunications Act*, earth stations operated as telecommunications carrier transmission facilities are exempt from the Canadian ownership and control requirements. Also, under the satellite policy, receive-only earth stations can be licence exempt. Since the opening of the Canadian satellite service market, the Department has included more than 50 foreign satellites on its list of approved FSS satellites.

As discussed in the consultation document, the bands 3700-4200 MHz (Lower 4 GHz) and 5915-6425 MHz (Lower 6 GHz) were used extensively in the past by the fixed service for high-capacity, point-to-point microwave systems, which formed part of the backbone of the Canadian telecommunications network, handling intercity voice, data and video traffic. The Department had ensured over the years that this spectrum was available for heavy-route long-haul microwave systems by specifying minimum RF channel growth requirements for systems wanting access to the bands. During the last decade, telecommunications companies have developed extensive intercity fibre optic facilities which carry most of the traffic once found on the heavy-route long haul microwave systems. Fibre transmission capacity has surpassed microwave capacity by several orders of magnitude, to the point where microwave systems at 4 and 6 GHz are used for certain inter-provincial cross sections and 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 microwave cross sections has greatly diminished.

In the responses to the consultation, views on the number of existing fixed service systems varied. However, as indicated by the incumbent users, there are still significant microwave cross sections in certain areas which are not planned for decommissioning in the foreseeable future. A general comment is that the use of the conventional 4 and 6 GHz bands under the current spectrum utilization policy is diminishing. New heavy route microwave systems are not being implemented, and new systems are constrained by the existing minimum RF channel growth requirement.

The intent of the 2002 consultation on these bands was to consider current use and to explore options to increase the use in the spectrum. For fixed services, removing the growth requirement would permit the introduction of systems which require high-capacity but which would not likely grow to the full heavy route RF channel capacity specified in the current utilization policy. This could become increasingly important for example in the development of microwave backhaul systems supporting Personal Communications Service (PCS) and Advanced Wireless Service (AWS) mobile networks which are forecast to require high-capacity (HC) even on preliminary systems and routes. The proposal for the introduction of low-capacity (LC) and medium-capacity (MC) across the 4 and 6 GHz bands was also intended to increase flexibility of use and to meet spectrum requirements for low-capacity systems, since the spectrum for LC below 3 GHz has gradually been replaced by new mobile services and spectrum for LC below 10 GHz is limited. Another aspect is the flexibility of current microwave radio equipment to provide scalable transmission capacities. It has become increasingly easy within new microwave equipment to expand system capacity as networks grow, 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.

On the other hand, for satellite services in the band, a proposal was received from Telesat Canada to transition the 4 and 6 GHz bands from co-primary fixed service and fixed-satellite service to an exclusive allocation to the satellite service. It was indicated that the exclusive operation by FSS in the C band would improve the economics of satellite services. The request emphasizes 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 proposal was supported by users and service providers with satellite interests in the band, and opposed by entities with fixed service interests in the band.

There are currently about 30 or so satellites using the conventional C band to serve the North American market. The new family of satellites being planned to populate some of the available orbital positions are expected to have a life span of 15 years or more. 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 antennas of less than 1 meter. As well, the combination of low frequency band and 2° satellite orbit spacing (in the US and other markets) 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 (Very Small Aperture Terminal) networks. Input to the consultation indicated that interference requirements and orbit spacing of 2 degrees on the arc dictate a minimum antenna diameter of 2.4 meters.

Commenters also indicated that an exclusive allocation for the FSS in the bands would facilitate the introduction of services such as transportable satellite news gathering (SNG) systems for which coordination on an area basis with terrestrial services would be problematic. The Department sought comments on allowing for increased exclusivity for both FS and FSS services, by placing emphasis on fixed and fixed-satellite services in either mutually exclusive geographic areas or for mutually exclusive portions of the frequency band. This proposal was however rejected by both FS and FSS proponents. In the comments, there was not sufficient justification or additional requirements presented that would warrant further consideration of an exclusive allocation of the conventional C band to the FSS service. Also, such a direction would be contrary to the Department's position that spectrum resources should be made available for allocations to several radio services, to maximize spectrum utilization.

3.1.2 Lower 4 GHz (3700-4200 MHz)

Under current spectrum utilization policies, the band 3700-4200 MHz is shared between co-primary fixed and fixed-satellite service (space-to Earth) systems on a coordinated first-come, first-served basis. Protection is afforded to systems which have been licensed by the Department after coordination with existing licensed systems. Provision is made for receive-only earth stations to be operated on a licence-exempt basis, but without protection from licensed systems. In their submission to the consultation, Cancom reported an estimated 2600 receiving earth stations located at cable head-ends across the country. An examination of the Department's licensing database however indicates that only a small percentage of these systems are licensed. Cancom argues that an exclusive allocation to FSS in this band would ensure that receive-only earth stations would not be subjected to interference from terrestrial systems.

Noting the trend for direct-to-consumer broadcast services occurring in the Ku band and plans for future services in the Ka band, and the arguments on terminal sizes above, the question is then how much growth can be expected for these services other than to small and/or remote communities. The Department is of the view that for this type of growth, coordination with fixed systems remains feasible.

It is worth noting that the US use of the band indicates a natural evolution to satellite services by virtue of the difficulty in coordinating terrestrial systems into an area where a receiving earth terminal has been licensed, particularly in urban areas. This is due to the low level of available margin which makes the satellite receivers susceptible to even low levels of interference. The band remains open to both public and private operational terrestrial microwave systems, channelized at 20 MHz bandwidth.

As previously discussed, the purpose of the consultation for this band was to explore options to increase the flexibility of use by both major co-primary services in these bands. The conclusion that can be drawn from the comments received is that a radical change of use by either service is neither immediately required nor warranted at this time. The Department will therefore neither move toward designating the band for exclusive FSS nor add low and medium-capacity for fixed services at this time.

In order to increase flexibility of use and to more closely align with use in the US, the Department will remove the minimum RF channel growth requirement for the band for high-capacity point-to-point fixed service systems. Equitable access to the band by both FS and FSS services will remain on a coordinated first-come, first-served basis.

Decision:

The Department is maintaining the designation of the band 3700-4200 MHz for fixed and fixed-satellite services.

The Department is maintaining the designation of the band 3700-4200 MHz for high-capacity point-to-point fixed service systems but is removing the minimum RF channel growth requirement.

3.1.3 Lower 6 GHz (5925-6425 MHz)

Under current spectrum utilization policies, the band is shared between co-primary fixed and fixed-satellite service (Earth-to-space) systems on a coordinated first-come, first-served basis. Protection is afforded to systems which have been licensed by the Department after coordination with existing licensed systems.

Satellite uplink terminals are not significantly affected by terrestrial microwave transmitters, and orbital avoidance constraints have been placed on the FS in order to protect FSS satellite receivers in the geostationary satellite orbit (GSO). Since terrestrial microwave receivers typically have good available margin, sharing is quite manageable.

As with the lower 4 GHz band, the removal of the RF channel growth requirement for fixed service systems in this band will improve the flexibility for new microwave systems. The addition of low and medium-capacity to this band was supported by terrestrial service interests to accommodate microwave applications which have traditionally had access to bands below 3 GHz, and which are increasingly being designated to support mobile services and wireless access applications.

Recognizing that the spectrum is paired with the lower 4 GHz band for satellite use, the same arguments apply. There is no evidence of a move toward satellite characteristics nor orbit spacing that would be required to facilitate the implementation of more ubiquitous applications similar to those currently in progress in the Ku and Ka bands.

The Department will therefore retain its intention to increase the flexibility of use of this spectrum and remove the minimum growth requirement for high-capacity fixed service systems in the band. In addition, medium-capacity systems will be permitted throughout the band. With respect to low-capacity, comments from the RABC indicated that a designation for 40+40 MHz would suffice. Comments however also highlighted the desirability of aligning spectrum use with that in the US to achieve economies of scale. There will also be a requirement to accommodate low-capacity systems, which will be encouraged to use spectrum other than the band 5850-5925 MHz, which will be designated for ITS applications (see Section 3.3). Noting that the accommodation of low-capacity systems in the lower 4 GHz band has been put on hold for a future review of spectrum use, and again emphasizing the scarcity of low-capacity spectrum in bands below 10 GHz, the Department will therefore allow for up to 150 MHz in total in the band 5925-6425 MHz to be designated for low-capacity systems.

The current designation for the band starts at 5915 MHz. With the designation for ITS applications in the band 5850-5925 MHz (see Section 3.3), the lower limit of the band will therefore start at 5925 MHz and channel plans will need to be adjusted. There are approximately 75 frequency assignments which fall into the overlap spectrum. These systems will be grandfathered with respect to any new channel plans for the 6 GHz band, and will be treated in a future spectrum and licensing policy with respect to the ITS services.

Decision:

The Department is maintaining the designation of the band 5925-6425 MHz for fixed and fixed-satellite services.

The Department is removing the minimum RF channel growth requirement for high-capacity point-to-point fixed service systems in the band 5925-6425 MHz and is adding a designation for up to 150 MHz of spectrum for low-capacity systems.

In addition, medium-capacity systems will be permitted throughout the band.

3.2 Allotment Paired Bands 4500-4800 MHz and 6725-7075 MHz for FSS

3.2.1 Background

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 MHz 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 (GoC). 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 from 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 systems employing large antenna earth stations located in areas outside of urban centres.

The consultation sought input on whether 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.

Perhaps predictably, comments were polarized. FSS proponents supported the implementation of satellite services anywhere and with any size of antenna under first-come first-served rules; while FS comments supported the retention of the application of domestic footnote C16A for the bands. The

addition of a mobile service allocation to the band 4500-4800 MHz and the designation of exclusive GoC use were opposed by the FSS community.

In deciding on the modifications to spectrum utilization policies for these bands, the Department noted the limited number of orbital positions available which are capable of serving the North American market and the difficulties anticipated in implementing satellites with a North American service area in accordance with the ITU plan in Appendix 30B of the *Radio Regulations*. The Department also noted the availability of other valuable spectrum at these positions and the recent development of new satellites at these positions using other spectrum. As well, the results of the *Call for Proposals to License Expeditiously a Ka band Space Station at the 107.3° West Longitude Orbital Position*, in September 2001, which offered the use of allotment bands for consideration illustrates there was no interest in the allotment bands, even in conjunction with valuable Ka band spectrum. For these reasons, it is not expected that satellites will be deployed to these three positions using this spectrum in the foreseeable future.

The Department noted in the consultation document that in the U.S., the band 4400-4940 MHz is allocated to the Federal Government for fixed and mobile services (MS). U.S. footnote US245 limits FSS use of the band 4500-4800 MHz to international intercontinental systems (meaning a few large antennas). FS uses include point-to-point, troposcatter and tactical radio relay. MS uses are video and data telemetry, remote piloted vehicles (RPV) and fleet defence. The US navy operates its Cooperative Engagement Capability (CEC) system in the band. 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 MHz and 4735-4895 MHz is limited to high-capacity systems and subject to traffic growth requirements.

The Department solicited comment with respect to terrestrial uses of the band 4500-4800 MHz — whether to designate additional low-capacity and medium-capacity spectrum for the fixed service and to remove the traffic growth requirements in the band 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. An additional proposal was also made to realign the designation of the spectrum restricted to use by the Government of Canada to include the bands 4400-4460 MHz and 4800-4900 MHz. Comments on behalf of the FS interests indicated that there was no objection to the proposals that would favour GoC uses in the band other than to ensure the continued protection of existing high-capacity fixed systems.

On further examination of the potential for use of the allotment C bands by the FSS, and continued use by the fixed service, and weighing those uses against the potential benefit for GoC applications to have access to spectrum which is harmonized with NATO uses, the Department has decided to designate priority to the use of the band for fixed and mobile services by the Government of Canada. A mobile allocation will be added and fixed and mobile service applications will be limited to use by the GoC in the band 4400-4940 MHz. A moratorium is placed on the licensing of new fixed service systems. Existing fixed service systems are grandfathered, with modifications allowed on a case-by-case basis. GoC systems will coordinate their use with these existing systems.

With respect to the use of FSS in the band 4500-4800 MHz, priority will be given to use of the fixed and mobile services by the Department of National Defence in the vicinity of major military bases. The Department will retain the application of a modified version of domestic footnote C16A for FSS use of the band 4500-4800 MHz. Use of the fixed-satellite service in this band shall be limited to applications that pose minimal constraints on the deployment of fixed and mobile service systems in the vicinity of major military bases. Use outside these areas will be on a first-come, first served coordinated basis with GoC fixed and mobile service systems.

Decision:

The Department will retain the application of a modified version of domestic footnote C16A for FSS use of the band 4500-4800 MHz.

A primary mobile allocation is added in the band 4400-4990 MHz, consistent with international footnote 5.442.

Fixed and mobile service applications are limited to use by the Government of Canada in the band 4400-4940 MHz in a modified footnote C25.

A moratorium is placed on the licensing of new non-Government of Canada fixed service systems in the band 4400-4940 MHz. Existing systems are grandfathered, with modifications allowed on a case-by-case basis.

Government of Canada systems will be co-ordinated with existing fixed service systems.

Details of the changes to the *Canadian Table of Frequency Allocations* can be found in the Allocation section of this document.

3.2.2 Additional Rearrangement of the band 4940-4990 MHz for services in support of Public Safety

In the US, the band 4940-4990 MHz was assigned as non-Federal Government exclusive use in 1999 and was proposed for wireless communication services. The band has since been designated for use in support of public safety. The intent is to facilitate emerging technologies which will support applications such as: wireless links from cameras, thermal imagers and 3D locators, wireless video and data transfer to portable command centers and large data file exchanges at specified locations. These are normally known as broadband public safety applications. The FCC has recently concluded the consideration of eligibility, licensing, service and technical rules.

While no specific change was proposed for the addition of Wireless Communications Services to the band 4940-4990 MHz, there was sufficient recognition given in the comments to the developments in the US that the Department is confident in making a similar designation at this time. The Department is therefore adding a primary allocation to the mobile service, except aeronautical mobile service, consistent with the *International Table of Frequency Allocations* footnote 5.442. The band

4940-4990 MHz is designated for fixed and mobile service use in support of public safety. The precise definition for use and eligibility for use will be developed in a spectrum and licensing policy for the newly designated applications in the near future. Any compatibility issues and necessary transition arrangements between existing GoC systems operating in the band and the newly designated applications will also be a subject for consideration in the development of a future spectrum policy. In the interim, new GoC systems are encouraged to take all practicable steps to use the band 4400-4940 MHz designated for their use in this policy, taking into account the existing licensed systems in the band.

Decision:

The Department is adding a primary allocation to the mobile service in the band 4940-4990 MHz, consistent with the *International Table of Frequency Allocations* footnote 5.442. The band 4940-4990 MHz is designated for fixed and mobile service use in support of public safety. The precise definition for use and eligibility for use will be developed in a spectrum and licensing policy for the newly designated applications in the near future. Any compatibility issues and necessary transition arrangements between existing GoC systems operating in the band and the newly designated applications will also be a subject for consideration in the development of the policy.

New GoC systems are encouraged to take all practicable steps to use the band 4400-4940 MHz taking into account the existing licensed systems in the band.

Details of the changes to the *Canadian Table of Frequency Allocations* can be found in the Allocation section of this document.

3.2.3 6425-7025 MHz

For the allotment C band 6725-7025 MHz, fixed service users supported the retention of the application of domestic footnote C16A to the band. However, similar arguments apply to sharing between receiving FS and transmitting FSS earth terminals as discussed for the conventional uplink C band. That is, satellite uplink terminals are not significantly affected by terrestrial transmitters, and orbit avoidance constraints apply to protect FSS satellite receivers at the GSO. Since terrestrial receivers typically have more available margin than satellite receivers, sharing is deemed to be more manageable than is the case in the satellite downlink bands. The Department is of the view that a requirement for earth stations to be individually coordinated and authorized (i.e. limited to non-ubiquitous deployments) will be sufficient to balance requirements and ensure compatibility on a first-come, first-served basis. The Department will therefore not retain the application of the current version of C16A to the band 6725-7025 MHz. Fixed service and fixed-satellite service stations will be coordinated on a first-come, first-served basis as is the current accepted practice in the conventional C band.

The consultation did not discuss the Earth-to space allocation to the fixed-satellite service in the band 6700-7075 MHz which is limited to feeder links for non-geostationary satellite orbit (NGSO) systems of

the mobile-satellite service. However, the recent notice of proposed rulemaking released in the US (FCC 03-318) on coordination of these systems with broadcast auxiliary systems is noted at this time. The Department solicited comments on whether to designate additional low-capacity spectrum for the fixed service in all or part of the band 6425-6930 MHz. There was some opposition to the addition of low-capacity to the band based on the interests of medium and high-capacity terrestrial uses. With the removal of the growth requirement for high-capacity systems in the 5925-6425 MHz band and the addition of low and medium capacities (see Section 3.1.3) these concerns should be alleviated.

In the US, this band is available for use by public safety, utilities, railroads and system control and data acquisition (SCADA) low-capacity applications, and was made available in 1993 for common carrier use. The band has been designated as a migration band for private systems being moved out of the 1.9 GHz band. A number of inputs subsequent to the consultation have highlighted the value of spectrum aligned with uses in the US. For example hydro companies wishing to install traffic routes extending into the US would benefit from a designation for low-capacity in the band 6525-6875 MHz.

The Department is therefore adding a designation to the 6525-6875 MHz portion of the band 6425-6930 MHz for low-capacity applications. The recent notice of proposed rulemaking released in the US (FCC 03-289) proposing expanded, unlicensed operation enabled by an interference temperature approach in the band 6525-6700 MHz is noted at this time.

Decision:

The Department will not retain the application of the current version of C16A to the band 6725-7025 MHz. Fixed service and fixed-satellite service stations will be coordinated on a first-come, first-served basis as is the current accepted practice in the conventional C band.

The Department is adding a designation to the band 6525-6875 MHz for low-capacity fixed service applications.

Details of the changes to the Canadian Table can be found in the Allocation section of this document.

3.3 Intelligent Transportation Systems in the Band 5850-5925 MHz

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

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 pre-emption of traffic lights and electronic inspection of moving trucks through data transmissions with roadside inspection facilities.

In Canada, the band 5850-5925 MHz is allocated on a primary basis to the fixed service, fixed-satellite service (Earth-to-space) 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 radiolocation 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 October 1999, the FCC allocated 75 MHz of spectrum in the band 5850-5925 MHz specifically for DSRC-based ITS systems but deferred consideration of licensing and service rules. There is now an NPRM seeking comment on definition of services and eligibility for use of the band, licensing and technical matters as well as a band plan submitted to the commission by ITS America.

Recognizing the importance of safety and efficiency to Canada's transportation infrastructure, the Department proposed designating 75 MHz of spectrum for ITS systems in the band 5850-5925 MHz. Comments were requested on the requirement to add a mobile allocation to the band to accommodate ITS applications, options to improve co-existence and the requirement if any for a moratorium on the licensing of new fixed systems. There was general support expressed in the comments for the addition of an allocation for the mobile service in the band 5850-5925 MHz as well as for the designation of the band for DSRC systems in ITS applications.

The Department is therefore adding a mobile allocation to the band 5850-5925 MHz.

The Department is designating the band 5850-5925 MHz for use by DSRC systems intended to provide wireless links to transfer information between vehicles and roadside systems. Such ITS applications should be in general accordance with the Canadian ITS Steering Committee Report on the Architecture Framework for ITS released in June 2000. A precise definition of use and eligibility for use will be developed in a future policy and licensing framework for the band. While work is already underway to identify a harmonized standard for ITS systems with the US and Mexico, further consideration could be given to interoperability, performance requirements and eventual coordination with US systems.

It is anticipated that the entire band will eventually be required for ITS applications, but the rate at which that happens and the time frame in which incumbent services are impacted is yet to be determined. There was very little support in the comments submitted for a moratorium on the licensing of point-to-point fixed systems at this time, given the status of development of ITS applications. The Department will reconsider the requirement for a moratorium on the licensing of new fixed service systems in the development of the policy framework described above. In the meantime however,

applicants for fixed systems in this band will be encouraged, to the extent practicable, to use spectrum in the adjacent band 5925-6425 MHz (see Section 3.1.3).

Decision:

The Department is adding a mobile allocation to the band 5850-5925 MHz. This band is designated for use by Dedicated Short Range Communication systems to support Intelligent Transportation System applications in the fixed and mobile services. New point-to-point fixed systems wanting to use the band in accordance with the existing guideline will be encouraged, to the extent practicable, to use spectrum in the adjacent band 5925-6425 MHz.

Details of the changes to the *Canadian Table of Frequency Allocations* can be found in the Allocation section of this document.

Future Consultation:

The Department will be consulting to determine the precise definition of use and eligibility for use of ITS applications in the future, including any necessary provisions for transition.

3.4 Further Consultation

The band 5850-5925 MHz is allocated to the FSS (Earth-space) on a co-primary basis. The Department notes the US allocation to FSS is limited under footnote US245 to international intercontinental systems, which in effect means that the number of actual earth terminals will be small, and coordination with terrestrial systems will not be difficult. Since the *List of Satellites Approved to Provide Fixed satellite Services (FSS) in Canada* does not contain any satellites employing the band 5850-5925 MHz, it is timely to request input on the status between FSS and DSRC systems now designated in the band.

Further Consultation:

The Department is therefore proposing to establish by domestic footnote that DSRC systems in the FS and MS services will have priority over FSS operation:

C16X In the band 5850-5925 MHz the use of the fixed and mobile services has priority over the use of the fixed-satellite service. The use of the fixed-satellite service in this band shall be limited to applications that pose minimal constraints on the deployment of fixed and mobile service systems. An example of such an application would be the use of a small number of large aperture earth stations, taking into account existing and potential service areas for ubiquitous deployment of fixed and mobile service systems.

Comment is sought on the proposal for a domestic footnote to ensure that DSRC systems in the FS and MS services have priority over FSS operations in the band 5850-5925 MHz.

A comment period of three months from the release of this document will apply.

Future Consultation:

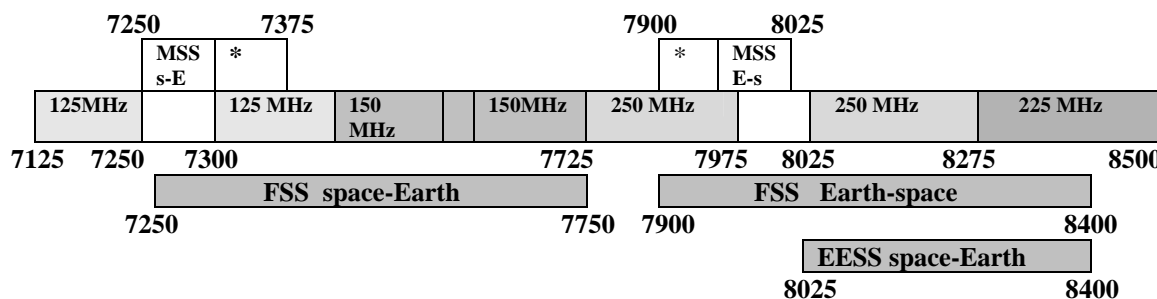
The precise definition of use and eligibility for use of ITS applications will be the subject of a future consultation.

3.5 8 GHz Band - Addition of Low-Capacity Fixed Service

The band 7725-8275 MHz is designated for medium and high-capacity fixed service microwave systems. In the consultation document the Department proposed the addition of a designation for fixed service low-capacity systems in the band. While there was general support for the proposal, Department of National Defence (DND) was opposed to the addition.

The band 7900-8400 MHz is shared with FSS (Earth-to-space), limited to the Government of Canada (GoC) and used by DND for a small number of earth stations. The band is used by DND and by NATO countries for national and internationally deployed military FSS communications. DND operates a NATO terminal at Folly Lake, Nova Scotia, and has invested heavily in transportable Tactical Long-Range Communications Terminals (TLRCT). The addition of low-capacity FS would impede the short notice military deployment of these FSS terminals across the country because of the need to coordinate with an anticipated increased number of FS systems. DND is also developing a number of suitcase-size FSS terminals in this military band. The Department notes that in the US, a similar FSS allocation, further restricted to military use, is shared with a number of FS applications. While the band is allocated exclusively to the Government, fixed service uses include point-to-point microwave links for remote data connections from air traffic control radars, weather, vessel traffic information, SCADA or the management of electric power distribution systems, as well as military fixed service applications.

Spectrum Pairings



The pairing for this FSS spectrum in the space-to-Earth (downlink) direction is in the band 7250-7750 MHz. This overlaps the band 7125-7725 MHz (7 GHz) designated for use by low, medium and high-capacity systems in the fixed service on a co-primary basis with FSS.

In the considerations for the C band it was noted that the low level of available margin makes satellite receivers susceptible to even low levels of interference, making coordination with terrestrial systems difficult. Conversely, satellite uplinks are not significantly affected by terrestrial transmitters, and since terrestrial receivers typically have more available margin than satellite receivers, sharing is deemed to be more manageable than is the case in the satellite downlink band.

The concern with the addition of low-capacity FS was the need to coordinate with an increased number of FS systems. Since this is inherently more difficult to achieve with receiving earth terminals than transmitting terminals, from an FSS perspective it would seem preferable to encourage the use of low-capacity systems in the uplink band.

An additional issue is that the Department has established preferred access for electric power utilities to parts of the 7 GHz microwave band for the carriage of critical telemetry, control and protection circuits by identifying two pairs of 30 MHz channels for their use. While low-capacity spectrum was only recently added to the band, the uptake of use for low-capacity in this portion of the spectrum has not been great. In making the designation for low-capacity it was anticipated that a transition from analogue to digital systems by the utilities 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. In the process of upgrading their systems to digital, some electric utilities have requested multiple 30 MHz channels. While the entire band is designated for high-capacity, the current Standard Radio System Plan (SRSP) has limited the number of 30 MHz channels in the band in order to facilitate access by low-capacity systems. This has meant that the high-capacity systems either use the adjacent band or implement on a non-standard basis. An additional benefit of a designation in the 8 GHz band for low-capacity systems is that some additional high-capacity channels could be considered in the 7 GHz band. This would simply require a revision of the SRSP by the Department in consultation with industry.

Recognizing the importance of GoC FSS use of the band and the concerns expressed by DND, the Department still sees value in the addition of a designation for low-capacity fixed service in the 8 GHz band shared with FSS in the Earth-to-space direction.

Decision:

The Department is adding a designation for low-capacity systems in the fixed service to the band 7725-8275 MHz.

In addition, since the consultation, DND has requested access to more of the band 7900-8025 MHz for military mobile-satellite service (MSS) applications. Present NATO satellites only carry 50 MHz (7975-8025 MHz) of the ITU MSS (primary) allocation in the band 7900-8025 MHz under footnote 5.461. The next generation of NATO satellites, which will be acquired under the NATO SATCOM Post-2000 Program, will have the capacity to use the full 7900-8025 MHz band for MSS use. The increased emphasis on deployed forces communications as opposed to strategic communications makes an increase in capacity for military mobile-satellite users necessary. While international footnote 5.461 making the allocation for MSS has been accepted in the *Canadian Table of Frequency Allocations* for the band 7900-8025 MHz (Earth-to-space), a primary allocation for MSS has only been made in the

band 7975-8025 MHz. This allocation is further limited to Government of Canada use by domestic footnote C50. Current spectrum utilization policies for the fixed service in the band avoid the use of the 50 MHz of spectrum allocated and designated for MSS due to the difficulty in coordination between the two services. This request is currently on hold pending additional clarification of the requirement. It will therefore not be treated in this document.

4.0 The Ku Band

The Ku-band refers to frequencies within the range 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 Background

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 allowed the introduction of competition in the fixed-satellite market and foreign fixed-satellite stations are being approved for use in Canada. In the consultation document, the Department noted that there are seven filings in the U.S. for global 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 which have a significant number of fixed systems.

As discussed in the consultation, 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 will 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 noted that Canada has three orbital positions (107.3°W, 111.1°W and 114.9°W longitude) available at which the Ku allotment bands can be used. Input was requested under the individual bands as to whether opening the allotment bands for 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, or whether the application of domestic footnote C16A should be retained.

4.2 10.7-11.7 GHz

The fixed service and fixed-satellite service (space-to-Earth) share the band on a primary basis. It is used by low, medium and high-capacity digital line-of-sight radio systems in the fixed service. Typical deployments of these fixed systems include single and multi-hop point-to-point configurations. These systems are authorized on a site-by-site and frequency-by-frequency basis.

This is also a downlink (space-to-Earth) band for the fixed-satellite service, with pairings for use prescribed by domestic footnotes C41 and C16B, and constraints on location and antenna size under footnote C16A.

In the comments to the consultation, the removal of the application of domestic footnote C16A to the band 10.7-11.7 GHz was supported by users and service providers with satellite interests in the band, and opposed by entities with fixed service interests in the band. It was the view of the FSS community that the FS and FSS should be coordinated on a first-come, first-served basis. Ubiquitous deployment of either service is not foreseen in this band and as such domestic footnote C16A is not required. In view of the FCC deliberation on the sharing issues between FS systems and GSO FSS earth stations, the FS community believes that it would be premature to provide full flexibility for the deployment of FSS earth stations in the band 10.7-11.7 GHz on a coordinated first-come, first-served basis with the fixed service. Therefore, the current provision in the footnote C16A should be retained.

It is also worth noting that as discussed at C band, there could be similar difficulties in coordinating transmitting terrestrial systems into an area where a receiving earth terminal has been licensed, particularly in urban areas. This is due to the low level of available margin which makes the satellite receivers susceptible to even low levels of interference.

Harmonization of use with the US was seen as an important objective by both fixed service and fixed-satellite service commenters. The 10.7-11.7 GHz 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. The consultation noted that in the US, footnote NG104 limits 10.7-11.7 GHz GSO FSS to international systems, which effectively limits the size and number of earth stations which are likely to appear. A further Order (FCC-00-418) limits the implementation of NGSO FSS to feeder link/gateway operations, which have been carefully defined to exclude service links directly to customer premises. The intention was to facilitate the coordination process between NGSO FSS earth stations and terrestrial operations by limiting the FSS to low density implementations. The continued use and growth of terrestrial systems within the band would be protected by effectively limiting the size and number of earth stations which could be implemented in the band.

A recent notice of proposed rulemaking discusses the possible adoption of a ‘growth zone proposal’ intended to supplement existing coordination procedures and facilitate sharing between fixed services and new NGSO FSS systems (FCC 03-318).

The Department notes that the process to differentiate between feeder links/gateways and service links in order to ensure sharing compatibility with the fixed service was difficult. While comments to the consultation indicated that the definitions may not align with intended implementations of future FSS systems, comments also indicated that the kinds of applications which would require ubiquitous deployments of earth terminals are not expected, in part due to the shared nature of the band.

The Department is of the view that a requirement for earth stations to be individually coordinated and authorized (i.e. limited to non-ubiquitous deployments) will be sufficient to balance requirements and ensure compatibility on a first-come, first-served basis. The Department notes that there are adjacent bands in which the FSS has exclusive access. Therefore the Department expects that in implementing

FSS earth terminals, practicable measures will be taken to facilitate the continued introduction of FS systems in the band, particularly in the vicinity of urban centres.

The Department is therefore implementing its proposal to allow first-come, first-served deployment of both FS and FSS services and will therefore not retain the application of the current version of C16A to the band 10.7-11.45 GHz. Fixed service and fixed-satellite service stations will be coordinated on a first-come, first-served basis as is the current accepted practice in the conventional C band.

Decision:

The Department will allow first-come first-served deployment of both the fixed service and the fixed-satellite service in the band 10.7-11.7 GHz, and will also remove the application of the current version of domestic footnote C16A.

Details of the changes to the *Canadian Table of Frequency Allocations* can be found in the Allocation section of this document.

4.3 12.7-13.25 GHz

The fixed service and fixed-satellite service (Earth-to-space) share the band on a primary 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 pickups. 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 of deployment of systems in this band can be considered as high density. The current utilization policy entitled *Revisions to Microwave Spectrum Utilization Policies in the Range of 1-20 GHz* (SP 1-20 GHz) limits the use of the band by FSS systems to implementations which do not constrain the use of the band by VHCM systems used in conjunction with CATV systems.

In the consultation document, the Department noted that in recent years with the wide deployment of fibre and coaxial CATV networks, a number of links in many VHCM systems have been decommissioned. Comment from the Canadian Cable and Television Association (CCTA) indicated that while this may be true in certain circumstances, the band still provides a cost effective alternative to fibre distribution in many other applications such as within and between regional systems.

In the comments to the consultation, the removal of the application of domestic footnote C16A to the band 12.7-13.25 GHz was supported by users and service providers with satellite interests in the band, and opposed by entities with fixed service interests in the band. It was the view of the FSS community that the FS and FSS should be coordinated on a first-come, first-served basis. Ubiquitous deployment of either service is not foreseen in this band and as such domestic footnote C16A is not required. In view of

the FCC deliberation on the sharing issues between FS systems and GSO FSS earth stations, the FS community believes that it would be premature to provide full flexibility for the deployment of FSS earth stations in the band 12.7-13.25 GHz on a coordinated first-come, first-served basis with the fixed service, therefore, the current provision in the footnote C16A should be retained.

It is also worth noting that as discussed at C band, satellite uplinks are not significantly affected by terrestrial transmitters, and since terrestrial receivers typically have more available margin than satellite receivers, sharing is deemed to be more manageable than is the case in the 10.7-11.7 GHz (satellite downlink) band.

Harmonization of use with the US was seen as an important objective by both fixed service and fixed-satellite service commenters. The consultation noted that in the US, footnote NG104 limits 12.7-13.25 GHz GSO FSS to international systems, which effectively limits the size and number of earth stations which are likely to appear. A further Order (FCC-00-418) limits the implementation of NGSO FSS to feeder link/gateway operations, which have been carefully defined to exclude service links directly to customer premises. The intention was to facilitate the coordination process between NGSO FSS earth stations and terrestrial operations by limiting the FSS to low density implementations. The continued use and growth of terrestrial systems within the band would be protected by effectively limiting the size and number of earth stations which could be implemented in the band. A recent notice of proposed rulemaking discusses the possible adoption of a coordination rules intended to supplement existing coordination procedures and facilitate sharing between mobile BAS/CARS operations and new NGSO FSS systems (FCC 03-318).

The Department notes that the process to differentiate between feeder link/gateways and service links in order to ensure sharing compatibility with the fixed service was difficult. While comments to the consultation indicated that the definitions may not align with intended implementations of future FSS systems, comments also indicated that the kinds of applications which would require ubiquitous deployments of earth terminals are not expected, in part due to the shared nature of the band.

The current utilization policy in SP 1-20 GHz limits the use of the band by FSS systems to implementations which do not constrain the use of the band by VHCM systems used in conjunction with CATV systems. The Department is of the view that the terrestrial use of the 12.7-13.25 GHz band is sufficiently mature that a requirement for earth stations to be individually coordinated and authorized (i.e. limited to non-ubiquitous deployments) will be sufficient to balance requirements and ensure compatibility on a first-come, first-served basis. The Department notes that there are adjacent bands in which the FSS has exclusive access. Therefore the Department expects that in implementing FSS earth terminals, practicable measures will be taken to facilitate the continued introduction of FS systems in the band, particularly in the vicinity of urban centres.

The Department is therefore implementing its proposal to allow first-come first-served deployment of both FS and FSS services and will therefore not retain the application of the current version of C16A to the band 12.7-13.25 GHz. Fixed service and fixed-satellite service stations will be coordinated on a first-come, first-served basis as is the current accepted practice in the conventional C band.

In June 2001, Radio Systems Policy 015, *Microwave Licensing Policy Respecting Carriage of Program Signals to Broadcasting Undertakings*, (RP-015) was rescinded and replaced by Radio Systems

Policy 022, *Microwave Licensing Policy Framework* (RP-022). The use of microwave radio facilities licensed to broadcasters for the carriage of program signals and other telecommunications services was liberalized with the removal of obligations for broadcasters to share, on a non-profit basis, new microwave radio facilities and/or programming signals with other broadcasters.

In the consultation the Department also solicited comments on the types of point-to-multipoint fixed system deployments which will continue to use the spectrum in the band 12.7-13.25 GHz, as well as the kind of new applications envisaged for this band. Comment particularly from the CCTA indicated that this band would remain an integral part of cable distribution networks for the foreseeable future. The Department was urged not to make additional specific designations for applications such as broadband wireless access or wireless cable distribution to the home. However, and in light of RP-022, the Department is of the view that it would still be timely to extend the designation for use of the fixed service in this band to include any application which supports broadcasting services, rather than favouring those used solely in conjunction with CATV systems.

Decision:

The Department will allow first-come first-served deployment of both fixed service and fixed-satellite service in the band 12.7-13.25 GHz, and remove the application of the current version of domestic footnote C16A.

The Department is extending the designation for use of the fixed service in this band to include any application which supports broadcasting services, rather than favouring those used solely in conjunction with CATV systems.

Details of the changes to the *Canadian Table of Frequency Allocations* can be found in the Allocation section of this document.

4.4 Two-way Messaging and Position Tracking

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). The consultation asked for input on action which could or should be taken regarding these applications. Comment indicated that these systems have already been operating for a number of years and have been successfully coordinated for use on a Canadian satellite. The Department will therefore not make additional provisions for these applications at this time.

Decision:

The Department will make no additional provisions for two-way messaging and position tracking satellite systems (mobile-satellite applications) currently operating on a secondary basis using fixed-satellite capacity.

4.5 13.75-14.0 GHz

The band 13.75-14.0 GHz is currently allocated to the fixed-satellite service in the uplink direction (Earth-to-space) and the radiolocation service on a co-primary basis. Prior to World Radio Conference 2003 (WRC-2003), the use of this band for fixed-satellite services was restricted to earth stations having a minimum antenna diameter of 4.5 meters. Regulatory changes adopted at WRC-2003 have relaxed these restrictions by allowing transmit earth stations as small as 1.2 meters in diameter, but adding a power flux-density (PFD) level to be met at the coast and at the border of an administration's territory for antennas smaller than 4.5 meters. The PFD limits mean that transmitting earth stations operating within a geographical strip along the border and the coast will need to apply mitigating techniques in order to comply. The calculated width of this geographic strip depends very much on the assumptions used for the calculations. While the limits have been adopted, the methodologies and allowable assumptions to determine compliance have not been stipulated in the *Radio Regulations*.

The Department is currently examining the implications both domestically and internationally of facilitating the implementation of earth stations using smaller diameter antennas in Canada. Currently, domestic footnote C41² suggests a pairing of the use of the band 13.75-14.0 GHz by the fixed-satellite services with the band 11.45-11.7 GHz in the space-to-Earth direction. Conditions have changed sufficiently since this footnote has last been modified in 1994, that the Department could consider alternative pairings for the downlink.

Provisional Changes:

The Department provisionally adopts the changes to the *Radio Regulations* made at WRC-03 which will facilitate the operation of transmitting earth stations with antenna diameters as small as 1.2 meters in the band 13.75-14.0 GHz under the restrictions prescribed in the *Radio Regulations*.

A comment period of 30 days from the release of this document will apply to these provisional changes. In the absence of compelling arguments to the contrary, these changes will be incorporated in the *Canadian Table of Frequency Allocations*.

² C41 (CAN-94) In the use of the fixed-satellite service by networks that are used principally for domestic fixed-satellite applications, the band 13.75-14.0 GHz in the Earth-to-space direction shall be used in conjunction with the band 11.45-11.7 GHz in the space-to-Earth direction.

Details of changes to the *Canadian Table of Frequency Allocations* can be found in the Allocation section of this document.

5.0 The Ka Band

5.1 Background

In Canada, the Ka band satellite spectrum includes the bands the 19.7-20.2 GHz (space-to-Earth) and 27.5-30.0 GHz (Earth-to-space). The bands 19.7-20.2 GHz and 29.5-30.0 GHz are designated on an exclusive and primary basis to the fixed-satellite service. This spectrum was allocated at the 1992 World Administrative Radiocommunication Conference (WARC-92), with the objective to develop multimedia consumer access satellite services. 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.

The Department has been 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 links/gateways in the bands 18.3-18.8 GHz, 28.35-28.6 GHz and 29.25-29.5 GHz.

At WRC-95, spectrum for FSS employing non-geostationary 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 sharing criteria for the use of this band.

The band 19.3-19.7 GHz is allocated to the FSS (space-to-Earth) and FS on a co-primary basis. The band 29.1-29.5 GHz is allocated to the FSS (Earth-to-space) and FS on a co-primary basis. Use by the FSS is limited to feeder links (FL) 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 (Resolution 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 Public Switched Telephone Network (PSTN) was established in the U.S. to serve the North American market.

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. The current spectrum utilization policies for the fixed service 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 Studio Transmitter Link (STL) and TV-pickup. These fixed service systems operate according to channelling plans defined in SRSP documents.

In the band 27.5-29.5 GHz, the FSS has a co-primary allocation with the fixed service. The band 25.35-28.35 GHz (28 GHz) is currently designated in Canada for Local Multipoint Communications Systems (LMCS). 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. Spectrum designations for fixed services have not been developed for the remaining band 28.35-29.5 GHz.

5.2 17.7-20.2 GHz

In making proposals for these bands, the Department took into account two existing models for designating the spectrum. The first is 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) of ERC/DEC/(00)07 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 later. These designations do not differentiate between GSO and NGSO implementations of the FSS further than described in international footnotes.

The second existing model is in the United States, where specific spectrum designations were made for each of the services in portions of the 17.7-20.2 GHz range. These U.S. domestic designations differentiate between GSO and NGSO implementations of the FSS. The FCC Report and Order for 18 GHz removed designations for secondary access to the bands while 28 GHz still makes provision for secondary access by other services.

In the consultation document, the Department recognized the importance of aligning spectrum use within the North American marketplace and the Americas particularly for satellite services. The Department wished to align spectrum designations, but sought to retain flexibility for all services within the bands, to the extent possible. Proposals were made that the band could be soft partitioned to emphasize the implementation of one service in a specific portion of the band, with access by co-primary services on a more restricted basis.

In the comments, there was considerable support for soft partitioning of the spectrum including the element of designating priority to the fixed service or the fixed-satellite service as appropriate, with limitations to avoid constraining the development of the service granted priority in the band. With respect to replacement texts for footnote C16A several different proposals were made relating to the individual portions of the band. In most of the proposed texts for replacement footnotes, the element of assigning priority to one or the other service was missing. As previously discussed, the concept of soft partitioning was to be applied in situations where it was desirable to place emphasis on the use of the spectrum by one service over another. In this fashion access to the spectrum would not be removed, but would be limited to implementations that would not constrain the development of the service for which priority would be given. This was intended to facilitate the implementation of applications or services

where the deployment of terminals would occur in a ubiquitous manner, with minimal burden of coordination and the possibility of authorization on a spectrum and geographic area basis. In contrast, many of the proposals for footnotes introduced the element of coordination between services in bands where it was intended to grant priority to the fixed service. The Department notes that the term coordination has long been associated with the access afforded to co-primary services sharing a band on an equitable first-come, first-served basis. As well, there are responsibilities and obligations placed on both parties in a coordination process. Since the intention of soft partitioning is to place emphasis on the implementation of one service, this element will not be incorporated in the footnotes for the band segments.

Current FCC Spectrum Designations

FS	FSS(GSO)	FSS (NGSO)	FS FSS (MSS FL)	FSS
17.7	18.3	18.8	19.3	19.7
				20.2

Proposal 17.7-20.2 GHz

BSS	FS	FSS	FSS	FS FSS (MSS FL)	FSS
17.7	17.8	18.58	18.8	19.3	19.7
					20.2

Existing Fixed Service Channel Plans

440 MHz	440 MHz VHCM	240 MHz	100 MHz	240 MHz	100 MHz	440 MHz
17.7	18.14	18.58	18.82	18.92	19.16	19.26
						19.7

5.2.1 17.7-17.8 GHz

No change was proposed to the status of services in this band. This band is allocated to the 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 the BSS is implemented in the 17 GHz band, feeder links will be accommodated in the 25 GHz band (see Canadian domestic footnotes C45 and C47).

Noting the *de facto* moratorium in Section 4.5 of SRSP-317.7 for the licensing of fixed systems in the band 17.7-17.8 GHz, and based on the possibility that a BSS service could be introduced in Canada as early as April 1, 2007 in the band 17.3-17.8 GHz, the RABC suggested that the Department issue a moratorium on the licensing of new fixed systems in the band 17.7-17.8 GHz as soon as practicable. It is also noted that domestic footnote C-45 effectively reduces the status of the fixed service to secondary with respect to the broadcast-satellite service after April 1, 2007.

The Department is in agreement with the comments received and is placing a moratorium on the licensing of new fixed service systems in the band 17.7-17.8 GHz. Transition issues have already been covered in domestic footnote C45.

5.2.2 17.8-18.58 GHz

It was proposed to place emphasis on a designation for FS in this band. Sharing with low density FSS use was deemed to be feasible if the use of spectrum for fixed-satellite services in the band would continue to be limited in accordance with the intentions of domestic footnote C16A. There was general support for this proposal.

The current FS designations in the band pairs 17.7-18.14 GHz with 19.26-19.7 GHz are for low, medium and high-capacity point-to-point systems, and in the contiguous band 18.14-18.58 are for Local MCS, VHCM, TV STL and TV-pickup. It should be noted that 17.7-17.8 GHz is paired with 19.26-19.36 GHz resulting in minimal impact from the respective BSS and FSS designations. The Department's original proposal would therefore have left the bulk of these two bands intact for use of fixed services.

The RABC strongly supported the Department's proposal for emphasizing a designation for FS in the band 17.8-18.58 GHz, along with a similar proposal for FS in the companion band 19.3-19.7 GHz. These two FS designations were seen as important, as there are currently a large number of LC/MC/HC radio systems operating in the paired bands 17.7-18.14 GHz and 19.26-19.7GHz, licensed in accordance with SRSP-317.7.

The RABC also urged the Department to leave the 18.14-18.58 GHz MCS/VHCM band intact since the 12.7-13.2 GHz VHCM band available to cable operators is limited to 500 MHz of spectrum. Cable operators' networks are expanding up to 860 MHz in some cases and, therefore, the current capacity of the existing VHCM band is insufficient to support the spectrum requirements of the operators. They will require additional spectrum to enable them to deliver/backhaul signals to their smaller, remote systems. The spectrum band between 18.14-18.58 GHz will provide that relief. These views were supported in a separate submission from the Canadian Cable and Television Association (CCTA). Coordination and equipment procurement were cited as important reasons to retain alignment with the designations for Cable Television Relay Service (CARS) applications in the US.

At the same time, the Department has been active in authorizing future Canadian geostationary Ka band multimedia satellites, in the band 19.7-20.2 GHz, to use associated spectrum for feeder link/gateways in the band 18.3-18.8 GHz. The gateways were 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 would minimize constraints on the deployment of fixed service systems.

The intent in proposing a definition of gateway/feeder link systems is that they represent the kind of low density applications which could be implemented with minimal constraint to the FS in bands which are designated as priority for the fixed service. Feeder link systems typically require higher performance and reliability and therefore use antennas which are very much larger in relation to the antennas for service links. Comments to the Department indicated that a feeder link/gateway definition may not be appropriate for the kinds of FSS systems envisaged for the Ka band. (i.e. not circuit switched architecture with bent pipe repeaters at the satellite, but an on-board processing model where the traditional double hop could be eliminated).

The Department notes the FCC Second Order on Reconsideration (FCC 02-317) which alters their current band plan to make FSS the sole primary spectrum allocation in the band 18.3-18.58 GHz. This adds to the current allocation to make 18.3-18.8 GHz exclusive GSO FSS spectrum and balances with the amount of uplink spectrum available for GSO FSS at 28 GHz in the US.

In Canada, the band 18.14-18.58 GHz has had little demand for access to date. As described in the CCTA submission, cable systems are only recently being rebuilt to 750-860 MHz capacity. As noted in the discussion on the 12 GHz band, in recent years with the wide deployment of fibre and coaxial CATV networks, a number of links in many VHCM systems have been decommissioned. The Department therefore anticipates that the demand for additional spectrum beyond the capacity currently available in the band 12.7-13.25 GHz to support cable systems can be handled on a case-by-case basis taking the anticipated future use and geographic area into account. With respect to the local MCS applications, this designation has resulted in the band being listed in Radio Systems Policy 20, *Guidelines on the Licensing Process and Spectrum Release Plan (RP-020)* as requiring a competitive process for licensing, and is currently listed as suspended, pending a future competitive process. The demand for MCS applications in this spectrum has been limited, perhaps in part because this band is either not available or has very limited use for wireless access in other markets. There is also an abundance of spectrum available for broadband wireless access and MCS services in bands between 23 and 38 GHz.

Based on the submissions, there is considerable interest from both terrestrial and satellite service providers to align spectrum in the band 17.8-19.7 GHz to the extent possible with the US to achieve economies of scale for equipment as well as to facilitate coordination. The Department will add a footnote to the *Canadian Table of Frequency Allocations* designating priority to the use of fixed services in the band 17.8-18.3 GHz. Multi-channel systems will be considered on a case-by-case basis taking the anticipated future use and geographic area into account. The designation for Local MCS is removed from the band 18.14-18.58 GHz, noting the next section on designations for the fixed-satellite service. The channel plan to accommodate this mix of applications and facilitate sharing, noting the asymmetry of paired spectrum available, will be developed by the Department in consultation with industry.

5.2.3 18.3-19.3 GHz

5.2.3.1 18.3-18.58 GHz

As previously discussed, the FCC has altered their current band plan to make FSS the sole primary spectrum allocation in the band 18.3-18.58 GHz, adding to the current allocation to make 18.3-18.8 GHz exclusive GSO FSS spectrum. At the same time, the Department has been active in authorizing future Canadian geostationary Ka band multimedia satellites, in the band 19.7-20.2 GHz, to use associated spectrum for feeder links/gateways in the band 18.3-18.8 GHz. Comments to the Department indicated that a feeder link/gateway definition may not be appropriate for the types of FSS systems envisaged for the Ka band. As well, in the submissions from both terrestrial and satellite proponents, there was considerable importance placed on the alignment of spectrum use in the band 17.8-19.7 GHz within the North American marketplace and the Americas, particularly for satellite services.

The band 18.14-18.58 GHz has not been available in Canada for several years and there are very few incumbent systems authorized to operate in the band. The Department is of the view that a designation of spectrum for priority use of fixed-satellite services in the band 18.3-18.58 GHz can be accomplished with minimal impact on terrestrial services. This will advance the alignment of spectrum for use of fixed-satellite services within the North American marketplace and should facilitate the introduction of multimedia consumer access satellite services. Further, the spectrum can be made available for FSS in a relatively short time frame since there are no issues surrounding a moratorium or transition for this portion of the band, and the anticipated requirement for spectrum for VHCM systems to support cable services has been treated in the previous section.

The Department is placing a moratorium on the licensing of fixed services in the band 18.3-18.58 GHz, and will add text to a footnote in the *Canadian Table of Frequency Allocations* designating priority to the use of fixed-satellite services in the band 18.3-18.58 GHz.

5.2.3.2 18.58-18.8 GHz

The spectrum utilization policies for fixed services operating in the band 18.58-19.26 GHz include provisions for low and medium-capacity point-to-point systems, and low-capacity MCS. These fixed service systems operate according to channelling plans defined in Standard Radio System Plan (SRSP) documents. There are currently two channel plans for the use of fixed services in the band 18.58-19.26 GHz. At the release of the consultation document, there were 670 licensed frequency assignments for low and medium-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. The MCS bands align with the previous designation for Digital Electronic Messaging Systems (DEMS) in the US, the licensees of which were transitioned to the 24 GHz band.

The consultation proposed to place emphasis on a designation for the use of fixed-satellite services in the band 18.58-18.8 GHz. Most submissions expressed support for this proposal, as well as a requirement for a moratorium on the licensing of new fixed service systems in the band. The Department is in agreement with the comments received and is placing a moratorium on the licensing of new fixed service systems in the band 18.58-18.8 GHz. Text will be added to a footnote in the *Canadian Table of Frequency Allocations* designating priority to the use of fixed-satellite services in the band 18.58-18.8 GHz.

Comments on the requirements for the transition between services were not solicited in the consultation. In line with the concept of soft partitioning, it could be argued that once a moratorium restricts the licensing of new FS systems in the band, it would be the responsibility of the FSS operators to locate receiving FSS terminals in areas where no interference is received from transmitting incumbent FS systems. However, situations may arise where the ubiquitous deployment of FSS terminals is blocked by a transmitting FS system. Therefore a sunset date on the full co-primary coordinated access to the spectrum by terrestrial services is required.

The Department notes the 10-year time frame granted in the original FCC Report and Order which allowed fixed services full co-primary status in the spectrum until June 8, 2010. The RABC submission suggested that Industry Canada undertake a subsequent consultation to deal with the issues of the existing FS, consistent with the prioritization of FSS use. Other comments expressed the view that a minimum 10-year time frame, similar to that granted in the US, would be required by incumbent fixed services.

A 10-year time frame is significantly more time than has traditionally been granted in other processes where there is a transition between services in a band. It is also much more than the timing allowed under Spectrum Utilization Policy SP-GEN, *General Information Related to Spectrum Utilization and Radio Systems Policies* (SP-GEN) for systems which become non-standard due to a change in either the policy or standards for a band. The Department is of the view however, that such a time frame could be granted without unduly constraining the deployment of satellite services in the band. Ten years from the date of publication of this policy document would not align precisely with the dates determined in the US for the band 18.58-18.8 GHz, however this would be offset by the fact that in the band 18.3-18.58 GHz, access for FSS on a priority basis is immediate and unencumbered. After the sunset date, operation of incumbent fixed service systems would be on a no-interference basis to FSS systems. In the meantime, mutually acceptable arrangements between FS and FSS operators would be required for earlier transition.

The provisions for transition are detailed at the end of this section.

5.2.4 18.8-19.3 GHz

The band 18.8-19.3 GHz contains the upper portions of the paired bands 18.58-18.82/18.92-19.16 GHz and 18.82-18.92/19.16-19.26 GHz, treated in the previous section. At the release of the consultation document, there were 670 licensed frequency assignments for low and medium-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. The MCS bands align with the previous designation for DEMS in the US, whose licensees were transitioned to the 24 GHz band.

The consultation proposed to place emphasis on a designation for the use of fixed-satellite services in the band 18.8-19.3 GHz. Most submissions expressed support for this proposal, as well as a requirement for a moratorium on the licensing of new fixed service systems in the band. The bands are paired with the lower bands treated in the previous section, so decisions for either the upper or lower portion will implicitly affect the paired spectrum. The issue of a moratorium on the licensing of new fixed service systems under the current utilization policies and standards becomes a moot point. The Department is however still in agreement with the comments received and is placing a moratorium on the licensing of new fixed service systems in the band 18.8-19.3 GHz. Text will be added to a footnote in the Canadian Table designating priority to the use of fixed-satellite services in the band 18.8-19.3 GHz.

This band is designated for non-geostationary fixed-satellite services in the US. The Department did not propose making a distinction in the band between GSO and NGSO systems. Events which have occurred since the publication of the consultation would indicate that this band may come under review for the designation of services. Industry Canada recognizes that the licensing activities of regional FSS systems in other countries, particularly U.S. licensing proceedings, will have an impact on how the

spectrum will be designated for a number of new FSS systems. This will be taken into consideration in the designation and authorization of spectrum for particular systems and technologies.

Similarly with the issue of the moratorium, transition provisions of FS systems in the lower band implicitly affect systems in the paired band. While there are currently no proposals for FSS systems in Canada which would trigger the displacement of FS systems, given the pairing issue, and the length of time granted in the sunset provisions in the lower portion, the Department is of the view that there would be little additional impact on incumbent FS systems by starting the clock for this band at the same time.

The provisions for transition are detailed at the end of this section.

5.2.5 19.3-19.7 GHz

It was proposed to place emphasis on a designation for FS in this band. Sharing with low-density FSS use was deemed to be feasible if the use of spectrum for fixed-satellite services in the band would continue to be limited in accordance with the intentions of domestic footnote C16A. There was general support for this proposal.

The current FS designations in the band pairs 19.26-19.7 GHz with 17.7-18.14 GHz are for low, medium and high-capacity point-to-point systems. It should be noted that 17.7-17.8 GHz is paired with 19.26-19.36 GHz resulting in minimal impact from the respective BSS and FSS designations.

The RABC strongly supported the Department's proposal for emphasizing a designation of FS in the band 19.3-19.7 GHz, along with a similar proposal for FS in the companion band 17.8-18.58 GHz. These two FS designations are important, as there are currently a large number of LC/MC/HC radio systems operating in the paired bands 17.7-18.14 GHz and 19.26-19.7 GHz, licensed in accordance with SRSP-317.7.

The Department will add a footnote to the Canadian Table designating priority to the use of fixed services in the band 19.3-19.7 GHz. Multi-channel systems will be considered on a case-by-case basis taking the anticipated future use and geographic area into account. The channel plan to accommodate this mix of applications and facilitate sharing, noting the asymmetry of paired spectrum available, will be developed by the Department in consultation with industry.

5.2.6 19.7-20.2 GHz

The consultation proposed no changes to the status of FSS in this band. Most submissions expressed support for this proposal. The Department will take no action on this band.

In the *Call for Applications to Develop and Operate Fixed-Satellite Space Stations in the 118.7 W Longitude Orbital Position* (DGRB-008-00), the Department indicated that a footnote would be incorporated in the *Canadian Table of Frequency Allocations* to indicate a preference for paired bands for the FSS. The footnote, in addition to footnote C16A, was also to 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).

However, based on the decisions made in this document (i.e. SP 3-30 GHz), this footnote will not be incorporated in the *Canadian Table of Frequency Allocations*.

Decision:

The Department is making the spectrum utilization policy provisions for the band 17.7-19.7 GHz as follows:

A moratorium is placed on the licensing of new fixed service systems in the band 17.7-17.8 GHz. Modifications to existing fixed service systems which do not increase the interference environment to FSS or which can be coordinated with FSS systems will be authorized on a case-by-case basis.

A footnote will be added to the *Canadian Table of Frequency Allocations* designating priority to the use of fixed services in the band 17.8-18.3 GHz and 19.3-19.7 GHz as follows:

C16D In the bands 17.8-18.3 GHz and 19.3-19.7 GHz use of the fixed service has priority over use of the fixed-satellite service in the space-to-Earth direction. Use of the fixed-satellite service in this band shall be limited to applications that pose minimal constraints on the deployment of fixed services. An example of such an application would be the use of a small number of large aperture earth stations, taking into account existing and potential service areas for ubiquitous deployment of fixed service systems.

Spectrum for low, medium and high-capacity point-to-point applications in the band 17.8-18.3 GHz can be paired with spectrum in the band 19.3-19.7 GHz.

Multi-channel systems will be considered on a case-by-case basis taking the anticipated future use and geographic area into account.

The designation for Local MCS is removed from the band 18.14-18.58 GHz.

A moratorium is placed on the licensing of new fixed service systems in the band 18.3-19.3 GHz until there is better definition of the kinds of fixed services which can be implemented with minimal constraints on the fixed-satellite services in accordance with the footnote.

Modifications to existing fixed service systems which do not increase the interference environment to FSS or which can be coordinated with FSS systems will be authorized on a case-by-case basis.

Events which have occurred since the publication of the consultation would indicate that the band 18.8-19.3 GHz may come under review for the designation of services. Industry Canada recognizes that the licensing activities of regional FSS systems in other countries, particularly U.S. licensing proceedings, will have an impact on how the spectrum will be designated for a number of new FSS systems. This will be taken into consideration in the designation and authorization of spectrum for particular systems and technologies.

The Department will add a footnote in the Canadian Table designating priority to the use of fixed-satellite services in the band 18.3-19.3 GHz as follows:

C16E In the band 18.3-19.3 GHz use of the fixed-satellite service has priority over use of the fixed service. Use of the fixed service in this band shall be limited to applications that pose minimal constraints on the deployment of fixed-satellite services. Domestic implementation of fixed-satellite services in the band 18.8-19.3 GHz will be governed by spectrum utilization policies which will be formulated in the future. These policies will take regional developments into consideration in the designation and authorization of spectrum for particular systems and technologies.

The Department is making the following provisions for transition:

Ten years after the date of publication of this document, the operation of incumbent fixed service systems in the band 18.58-19.3 GHz, licensed in accordance with SP 1-20 GHz, will be on a no-interference basis with respect to fixed-satellite services. Until such time, existing licensed fixed-service systems may continue to operate under the current provisions, including coordination with co-primary fixed-satellite services.

The Department will, on behalf of the FSS licensee, issue formal notifications to the incumbent licensees for the displacement of affected fixed frequency assignments on an as-required basis, a minimum of one year prior to the sunset date. These systems will need to be identified to the Department by the FSS licensee in sufficient time for notification to be issued.

Earlier displacement to the formal notification date may be achieved through mutually acceptable arrangements between the FSS operators and the affected microwave operator(s).

Fixed station operators will cease operation of the identified frequency assignments on or before the date in the served notification.

Industry Canada will retain oversight of the displacement process and will assist, where necessary, affected fixed operators in identifying new replacement frequency assignments.

Industry Canada will monitor the effectiveness of the spectrum policy provisions related to the displacement of fixed systems.

Based on the decisions made in this document, footnote CXX (CAN 01) will not be incorporated in the *Canadian Table of Frequency Allocations*.

~~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).~~

Details of the changes to the *Canadian Table of Frequency Allocations* can be found in the Allocation section of this document.

Designations 17.7-19.7 GHz

BSS	FS	FSS	FSS	FS FSS (MSS FL)	FSS
17.7 17.8	18.3	18.8	19.3	19.7	20.2

5.2.7 Further Consultation 19.3-19.7 GHz

The band 17.7-19.7 GHz is allocated internationally to the fixed-satellite service in the space-to-Earth direction. The 19.3-19.7 GHz band has an additional allocation to FSS in the opposite direction, Earth-to-space. In its' response to the consultation, the RABC suggested the deletion of this allocation as this usage has not materialized and this requirement seems to have disappeared. The Department supports this view and will provisionally implement the removal of the allocation to FSS in the Earth-to-space direction in the band 19.3-19.7 GHz from the Canadian Table.

The Department also notes the US domestic footnote:

NG166 The use of the band 19.3-19.7 GHz by the fixed-satellite service (space-to-Earth) is limited to feeder links for the mobile-satellite service.

Given the designations that are made in this document and the apportionment of the amount of spectrum for priority access by fixed and fixed-satellite services, the Department will provisionally adopt a similar footnote in the Canadian Table.

Provisional Changes:

The Department provisionally removes the allocation to FSS in the Earth-to-space direction in the band 19.3-19.7 GHz.

The Department provisionally adopts a footnote in the Canadian Table as follows:

CYY The use of the band 19.3-19.7 GHz for fixed-satellite services (space-to-Earth) is limited to feeder links for the mobile-satellite service.

A comment period of 30 days from the release of this document will apply to these provisional changes. In the absence of compelling arguments to the contrary, these changes will be incorporated in the Canadian Table.

Details of the changes to the Canadian Table can be found in the Allocation section of this document.

5.3 27.5-30.0 GHz

In making proposal for these bands, the Department took into account two existing models for designating the spectrum. The first is 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 of that document. These designations do not differentiate between GSO and NGSO implementations of the FSS further than described in international footnotes. The second existing model is in the United States, where specific spectrum designations were made for each of the services in portions of the 27.5-30.0 GHz range. These U.S. domestic designations differentiate between GSO and NGSO implementations of the FSS. The FCC Report and Order for 28 GHz also still makes provision for secondary access by other services to the designations while at 18 GHz secondary access has been removed.

In the consultation document, the Department recognized the importance of aligning spectrum use within the North American marketplace and the Americas particularly for satellite services. The Department wished to align spectrum designations, but sought to retain flexibility for all services within the bands. Proposals were made that the band could be soft partitioned to emphasize the implementation of one service in a specific portion of the band, with access by co-primary services on a more restricted basis.

In the comments, there was considerable support for soft partitioning of the spectrum including the element of designating priority to the fixed service or the fixed-satellite service as appropriate, with limitations to avoid constraining the development of the service granted priority in the band. With respect to replacement texts for footnote C16A several different proposals were made relating to the individual portions of the band. In most of the proposed texts for replacement footnotes, the element of assigning priority to one or the other services was missing. As previously discussed, the concept of soft partitioning was to be applied in situations where it was desirable to place emphasis on the use of the spectrum by one service over another. In this fashion, access to the spectrum would not be removed, but would be limited to implementations that would not constrain the development of the service for which the priority would be given. This was intended to facilitate the implementation of applications or services where the deployment of terminals would occur in a ubiquitous manner, with minimal burden of coordination and the possibility of authorization on a spectrum and geographic area basis. In contrast, many of the proposals for footnotes introduced the element of coordination between services in bands where it was intended to grant priority to fixed services. The Department notes that the term coordination has long been associated with the access afforded to co-primary services sharing a band on an equitable first-come, first-served basis. As well, there are responsibilities and obligations placed on both parties in a coordination process. Since the intention of soft partitioning is to place emphasis on the implementation of one service, this element will not be incorporated in the footnotes for the band segments.

Current FCC Spectrum Designations

FS	FSS (GSO)	FSS NGSO	FS FSS (MSS FL)	FSS GSO FSS (MSS FL)	FSS
27.5	28.35	28.6	29.1	29.25	29.5
					30.0

Proposal 27.35-30 GHz

FS	FSS	FSS	FS FSS (MSS FL)	FSS FSS (MSS FL)	FSS
27.35	28.35	28.6	29.1	29.25	29.5
					30.0

5.3.1 27.35-28.35 GHz

No changes were 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 on the deployment of fixed service systems, such as a small number of large antennas for feeder links, in accordance with Canadian Table, domestic footnote C47A.³

Modifications to footnote C47A to bring it in line with other footnotes adopted for Ka band in this document and will be treated in a general clean-up exercise being proposed for the Canadian Table.

5.3.2 28.35-28.6 GHz

The consultation proposed to place emphasis on a designation for the use of fixed-satellite services in the band 28.35-28.6 GHz. The Department has already been active in authorizing future Canadian geostationary Ka band multimedia satellites, in the band 29.5-30.0 GHz, to use associated spectrum for feeder links/gateways in the bands 28.35-28.6 GHz and 29.25-29.5 GHz.

Most submissions expressed support for this proposal, as well as a requirement for a moratorium on the licensing of new fixed service systems in the band. The Department is in agreement with the comments received and is placing a moratorium on the licensing of new fixed service systems in the band 28.35-28.6 GHz. Text will be added to a footnote in the Canadian Table designating priority for the use of fixed-satellite services in the band 28.35-28.6 GHz.

³ **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.

There are no incumbent fixed services authorized in this band since spectrum utilization policies for it have not been developed until now. There are no issues of transition in this band which would result from a designation of priority access to fixed-satellite services.

5.3.3 28.6-29.1 GHz

The consultation proposed to place emphasis on a designation for the use of fixed-satellite services in the band 28.6-29.1 GHz. Most submissions expressed support for this proposal, as well as a requirement for a moratorium on the licensing of new fixed service systems in the band.

The Department is in agreement with the comments received and is placing a moratorium on the licensing of new fixed service systems in the band 28.6-29.1 GHz. Text will be added to a footnote in the Canadian Table designating priority to the use of fixed-satellite services in the band 28.6-29.1 GHz.

This band is designated for non-geostationary fixed-satellite services (NGSO FSS) in the US. The Department did not propose making a distinction in the band between GSO and NGSO systems. Events which have occurred since the publication of the consultation would indicate that this band may come under review for the designation of services. Industry Canada recognizes that the licensing activities of regional FSS systems in other countries, particularly U.S. licensing proceedings, will have an impact on how the spectrum will be designated for a number of new FSS systems. This will be taken into consideration in the designation and authorization of spectrum for particular systems and technologies.

There are no incumbent fixed services authorized in this band since spectrum utilization policies for it have not been developed until now. There are no issues of transition in this band which would result from a designation of priority access to fixed-satellite services.

5.3.4 29.1-29.25 GHz

In the consultation, the Department proposed to place emphasis on a designation for FS in this band. Sharing with low density FSS (MSS feeder links) use was deemed to be feasible if the use of spectrum for fixed-satellite services in the band would continue to be limited in accordance with the intentions of domestic footnote C16A. There was general support for this proposal.

The Department proposed designating this band for LMCS type of services with pairing at 31.0-31.3 GHz. The combined proposal is treated in Section 5.3.9. Comments indicated general support for aligning this spectrum with the current Local Multipoint Distribution Systems (LMDS) designations in the U.S., however the RABC noted that it would be premature to designate additional spectrum for LMCS based on the history of use to date.

In any event, there is sufficient interest in this spectrum for the Department to make a designation granting priority to fixed services. A footnote will be added the Canadian Table designating priority to the use of fixed services in the band 29.1-29.25 GHz. As indicated in the original proposal for the designation of this spectrum, the licensing of systems within this band will be the subject of a future consultation.

5.3.5 29.25-29.5 GHz

The consultation proposed to place emphasis on a designation for the use of fixed-satellite services in the band 29.25-29.5 GHz, including feeder links for MSS systems. The Department has already been active in authorizing future Canadian geostationary Ka band multimedia satellites in the band 29.5-30.0 GHz, to use associated spectrum for feeder links/gateways in the bands 28.35-28.6 GHz and 29.25-29.5 GHz.

Most submissions expressed support for this proposal, as well as a requirement for a moratorium on the licensing of new fixed service systems in the band. The Department is in agreement with the comments received and is placing a moratorium on the licensing of new fixed service systems in the band 29.25-29.5 GHz. Text will be added to a footnote in the Canadian Table designating priority for the use of fixed-satellite services in the band 29.25-29.5 GHz.

There are no incumbent fixed services authorized in this band since spectrum utilization policies have not been developed for it until now. There are no issues of transition in this band which would result from a designation of priority access to fixed-satellite services.

5.3.6 29.5-30 GHz

The consultation proposed no changes to the status of FSS in this band. Most submissions expressed support for this proposal. The Department will take no action on this band.

In the call for applications for the geostationary orbit position at 118.7 W Longitude, the Department indicated that a footnote would be incorporated in the Canadian Table 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).

Based on the decisions made in this document, this footnote will not be incorporated in the Canadian Table. This has already been treated in the section on the 18 GHz portion of Ka band (5.2.6).

Decision:

The Department is making spectrum utilization policy provisions for the band 28.35-30.0 GHz as follows:

A moratorium is placed on the licensing of new fixed service systems in the bands 28.35-29.1 GHz and 29.25-29.5 GHz until there is better definition of the types of fixed services which can be implemented with minimal constraints on the fixed-satellite services in accordance with the footnote C16F.

Events which have occurred since the publication of the consultation indicate that the band 28.6-29.1 GHz may come under review for the designation of services. Industry Canada recognizes that the licensing activities of regional FSS systems in other countries, particularly U.S. licensing proceedings, will have an impact on how the spectrum will be designated for a number of new FSS systems. This will be taken into consideration in the designation and authorization of spectrum for particular systems and technologies.

A footnote will be added to the Canadian Table designating priority to the use of fixed-satellite services in the bands 28.35-29.1 GHz and 29.25-29.5 GHz as follows:

C16F In the bands 28.35-29.1 GHz and 29.25-29.5 GHz use of the fixed-satellite service has priority over use of the fixed service. Use of the fixed service in this band shall be limited to applications that pose minimal constraints on the deployment of fixed-satellite services. Domestic implementation of fixed-satellite services in the band 28.6-29.1 GHz will be governed by spectrum utilization policies to be developed. These policies will take regional developments into consideration in the designation and authorization of spectrum for particular systems and technologies.

A footnote will be added to the Canadian Table designating priority to the use of fixed services in the bands 29.1-29.25 GHz as follows:

C16G In the band 29.1-29.25 GHz use of the fixed service has priority over use of the fixed-satellite service. Use of the fixed-satellite service in this band shall be limited to applications that pose minimal constraints on the deployment of fixed services. An example of such an application would be the use of a small number of large aperture earth stations, taking into account existing and potential service areas for ubiquitous deployment of fixed service systems.

Based on the decisions made in this document, footnote CXX (CAN 01) will not be incorporated in the Canadian Table.

~~**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).**~~

Details of the changes to the *Canadian Table of Frequency Allocations* can be found in the Allocation section of this document.

Future Consultation:

The policy and licensing framework for systems within the bands 29.1-29.25 GHz and 31.0-31.3 GHz will be the subject of a future consultation.

Designations 27.35-30 GHz

FS	FSS	FSS	FS FSS (MSS FL)	FSS FSS (MSS FL)	FSS
27.35	28.35	28.6	29.1	29.25	29.5
					30.0

5.3.7 Further Consultation 27.35-28.35 GHz

This band is currently designated for LMCS in the fixed service. The use of the spectrum in this band was originally licensed to a number of applicants as a complete package of 1 GHz within a given area. Over the last several years, the licenses have been returned to the Department.

In the initial licensing process, the business plans to deliver wireless broadband services to subscribers called for access to the entire 1 GHz of spectrum in order to meet capacity and spectrum re-use requirements. One concern that had been expressed at the time was the limited separation of spectrum that would be available to accommodate two-way traffic (go and return channel separation) particularly given the requirement to use the entire 1 GHz of spectrum within a given area to meet capacity requirements. Any requirement for a guard band between the go and return channels would limit the spectrum and therefore the capacity available. Since that time, major improvements have been made in the technology that will facilitate the implementation of systems within the band. As well, the business case for systems to use the entire spectrum within a given area is changing, particularly in rural areas. It is within these rural areas that the Department has received a number of requests for developmental licenses to prove technologies for the delivery of broadband services.

As detailed in the Department’s Spectrum Release Plan (RP-020), it can generally be anticipated that the licensing of multipoint spectrum in urban areas will generate sufficient initial interest that a competitive process will be required. In rural areas however the initial demand is typically lower, with much less probability that multiple applicants will wish to use the same spectrum to serve the same area. The availability of several licences to use spectrum within a band in a given area would further reduce the possibility of mutually exclusive demands precipitating the requirement for a competitive process in many rural areas.

Given the developments to date, the Department is seeking comment on the potential for dividing the spectrum in the band 27.35-28.35 GHz into paired blocks to accommodate a minimum of three licensable packages, to be made available on a first-come, first served basis in rural areas.

Further Consultation:

In order to facilitate access in rural areas, the Department proposes to divide the spectrum in the band 27.35-28.35 GHz into smaller blocks such as three paired blocks of 150+150 MHz separated by a common go-return spacing of approximately 550 MHz.

The Department also proposes to make licences to use this spectrum available on a first-come, first-served basis in rural areas where it is evident that there is more spectrum than demand.

The Department seeks comment on these proposals as well as on the following:

- (1) The suitability of defining rural areas as those areas for which the population density does not exceed 400 people per square kilometre as measured by the latest Statistics Canada Census Report.**
- (2) The designation of a buffer zone and/or other conditions to avoid encroachment on the eventual use of this spectrum in urban areas.**
- (3) The block pairing accommodates frequency division duplex systems. Are there measures which should be introduced or other accommodations which should be made for time division duplex systems (TDD) such as guard bands between the blocks, or dedicated spectrum for TDD use?**

A comment period of three months from the release of this document will apply.

5.3.8 Further Consultation 29.1-29.25 GHz

The Department notes US domestic allocation of the band 29.1-29.25 GHz that limits use of the band by the fixed-satellite service (Earth-to-space) to feeder links for the mobile-satellite service. While the proposals for this band indicated that the low density applications in the fixed-satellite service were feeder links for the mobile-satellite service, the Department would like to clarify its intentions for access to this band which has been designated on a priority basis for fixed services.

Provisional Changes:

The Department provisionally adopts a footnote in the *Canadian Table of Frequency Allocations* as follows:

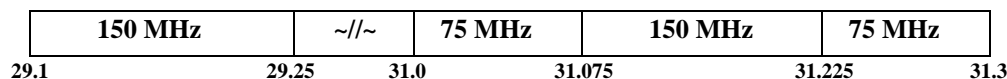
CZZ The use of the band 29.1-29.25 GHz by the fixed-satellite service (Earth-to-space) is limited to feeder links for the mobile-satellite service.

A comment period of 30 days from the release of this document will apply to these provisional changes. In the absence of compelling arguments to the contrary, these changes will be incorporated in the Canadian Table.

Details of the changes to the *Canadian Table of Frequency Allocations* can be found in the Allocation section of this document.

5.3.9 Further Consultation 31.0-31.3 GHz

This band is allocated to mobile and fixed services on a primary basis. The Department proposed to designate the band 31.0-31.3 GHz for LMCS, and to structure the band in a manner that would pair the centre 150 MHz with the spectrum at 29.1-29.25 GHz and also pair the two 75 MHz blocks at either end as shown below.



Comments on this proposal indicated general support for aligning this spectrum with the current LMDS designations in the US, however the RABC noted that it would be premature to designate additional spectrum for LMCS based on the history of its use to date. The Department also notes on-going international activities to study adjacent band issues with passive services for the possible implementation of High Altitude Platform Stations (HAPS) in the fixed service in the band 31.0-31.3 GHz. In any event, there is sufficient interest in this spectrum for the Department to make a designation reserving it for terrestrial services to be implemented in multipoint, transportable and/or mobile configurations. As indicated in the original proposal for the designation of this spectrum, the licensing of systems within this band will be the subject of a future consultation. The designation for the band 29.1-29.5 GHz has been treated in Section 5.3.4.

Decision:

The band 31.0-31.3 GHz is designated for terrestrial services to be implemented in multipoint, transportable and/or mobile configurations.

Future Consultation:

The policy and licensing framework for systems within the bands 31.0-31.3 GHz and 29.1-29.25 GHz will be the subject of a future consultation.

6.0 Additional Issues

6.1 Very Low-capacity (VLC)

The current definition of traffic load for low-capacity systems comprises bit rates between 1.544 Mb/s (T-1) and 24.704 Mb/s (16 T-1). The Department sought 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. Respondents saw no requirement for the provision of fractional T1 links in these bands. The RABC suggested that there is no need to change the definition of low-capacity systems as currently defined in SP 1-20 GHz since the current note in SP 1-20 GHz stating that “Smaller system capacities are also permitted in LC bands on a case-by-case basis” would be adequate to meet any unforeseen demand for traffic rates less than 1.544 Mb/s. The Board also noted that the FCC Part 101 rules do not permit the use of traffic rates less than DS-1 in any radio system employing digital modulation and operating below 19.7 GHz.

Decision:

The Department will make no additional provisions for systems with traffic rates of less than 1.544 Mb/s.

6.2 Domestic Coordination Considerations

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

In the consultation, the Department noted the FCC Notice of Proposed Rule Making (NPRM) (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 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 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.

The Department sought comment on the suitability of adopting similar spectrum sharing arrangements as in the FCC proposal in C and Ku bands. Respondents noted that the petition in the US had been denied and that current practices in Canada were satisfactory.

Decision:

The Department will not make modifications to the domestic coordination practices for any of the bands for which comment was solicited.

6.3 Licence-exempt Applications Below 10 GHz

There has been a lot of interest in licence-exempt applications, particularly for wireless local area networks which can be characterized as local transmission devices available to provide a wide range of applications for high-speed broadband digital distribution including voice, video and data. The current spectrum designations for these devices are in the 900 MHz, 2.4 GHz and 5 GHz bands which are shared with ISM applications.

The Department is interested in determining the general need and opportunities for spectrum to provide greater choice of access and distribution technologies to service providers and users in bands below 10 GHz. It therefore sought comments on whether there is spectrum where LE applications could be designated, the amount of spectrum that would be required, and the types of applications that could be accommodated.

Responses focused mainly on the perceived opportunities at 5470-5725 MHz, which was on the agenda of the WRC-03 for the consideration of regulatory provisions and spectrum requirements for new and additional services in the band. In preparation for participation at the conference, Canada developed a series of proposals, in consultation with industry, for the treatment of these issues.

At WRC-03, decisions were made to adopt a number of changes to the *International Table of Frequency Allocations* to provide new or upgraded allocations to the mobile, Earth exploration-satellite (active), space research (active) and radiolocation services. As well, a number of international footnotes were adopted to facilitate sharing amongst the services in the 5 GHz range. In general, the results of WRC-03 reflect Canada's positions prior to the conference.

The Department has since issued a consultation document proposing frequency allocation changes to the mobile, Earth exploration-satellite (active), space research (active) and radiolocation services, taking into account decisions taken by WRC-03. Furthermore, this document proposes new or revised policy and technical rules governing the use of wireless local area networks operating in the 5 GHz band. These proposals can be found in the consultation document announced in Canada Gazette Notice DGTP-005-04 and entitled *Consultation on Allocation Changes and Revisions to Spectrum Utilization Policy and Technical Rules in the 5GHz Band*.

Comments from the Bell Telecom Group and TELUS both requested the Department to assess the potential of harmonization with the FCC's Part 15 rules on ultra-wide band (UWB) technology. On 14 February 2002 the FCC issued a News Release advising of the adoption of a First Report and Order (FCC 02-08) regarding the revision of Part 15 rules which permits the marketing and operation of certain types of new products incorporating UWB technology. The UWB technology is expected to provide a vast array of new applications that have the potential to provide new public safety applications and broadband Internet access among the uses envisioned. The Order includes also standards designed to ensure that existing and planned radio services, particularly safety services, are adequately protected.

Future Consultation:

The Department is following developments of UWB technologies and will consult in the near future on the potential introduction of UWB applications and devices.

6.4 Further Consultation

The Department notes the recent FCC 02-328 Notice of Inquiry released December 20, 2002 seeking comment on the feasibility of permitting unlicensed devices to operate in the band 3650-3700 MHz, and under more restrictive conditions in the TV broadcast bands.

In 1997, the Canadian Table was modified to include an allocation for fixed services in the band 3400-3500 MHz. In 1998 the Department designated the band 3400-3700 MHz for Fixed Wireless Applications (FWA) and opened the band 3400-3550 MHz for licensing in rural areas. In 2003 the band was rearranged to accommodate priority spectrum for radiolocation and fixed wireless access systems. The Department will be licensing the band 3475-3650 MHz, including urban areas, in the near future.

The band 3500-4200 MHz had traditionally been available for fixed service and fixed-satellite service systems on a coordinated first-come first-served basis. When the Department opened the band 3400-3550 MHz under SP 3400-3700 MHz for licensing FWA systems in rural areas on a first-come, first-served basis in 1998, it established that new point-to-point systems would not be authorized to use assignments in the band 3500-3700 MHz. Existing point-to-point systems would be permitted to continue, provided the technical characteristics were in accordance with the current SRSP. Extensions and/or expansions of existing systems which require the use of assignments in the band 3500-3700 MHz were considered by the Department on a case-by-case basis outside of urban centres. *Policy and Licensing Procedures for the Auction of Spectrum Licenses in the 2300 and 3500 MHz Bands* (DGRB-003-03) imposes a moratorium on the licensing of point-to-point systems in the band 3500-3650 MHz and provides a detailed transition policy to accommodate FWA systems.

With respect to the use of the band by the fixed-satellite service, traditional authorization for domestic and Canada-US traffic has been in the conventional C-band between 3700-4200 MHz. However, authorizations of earth stations using foreign satellites providing international overseas traffic have included the extended C-band between 3500-3700 MHz. These earth stations are limited in number and are located in isolated areas, away from urban centres.

DGRB-003-03 limits the authorization of new FSS earth stations in the bands 3500-3650 MHz to large antenna applications such as gateways located in remote areas outside urban centres. Furthermore, the licensing of any new FSS receiving earth stations in the band 3500-3650 MHz will be subject to successful prior coordination with FWA licensees. FWA operators planning to establish systems in the vicinity of existing FSS receive earth stations will be required to coordinate with the earth station operators. Currently there are earth stations in the band 3500-3700 MHz located in Weir, Que. (Laurentides).

In 2001 the consultation on licensing FWA systems in urban areas noted that although this spectrum is not available for FWA in the US, the FCC had earmarked the band 3650-3700 MHz for advanced communication services. The consultation also indicated that the public interest in harmonizing this spectrum would be sufficient to delay a decision on licensing this spectrum in Canada until further progress had been made in the US.

In the US, this band was allocated for radiolocation uses by the government and for FSS use by non-government entities, restricted to international intercontinental systems. In 1999, the spectrum became part of the spectrum transferred from government to non-government. Noting the limited use by existing licensed systems in the band, the FCC is soliciting comment on the conditions under which unlicensed and/or licensed systems could be authorized in the band. The discussions lean toward permitting unlicensed devices at power levels similar to those currently allowed in the ISM bands at 900 MHz, 2.4 GHz and 5.7 GHz. As of December 1, 2000, new earth stations in the band 3650-3700 MHz are authorized on a secondary basis to the fixed and mobile services.

The possibility for licence-exempt devices to operate in the in the TV broadcast bands is beyond the intended scope of the consultation in this document.

Further Consultation:

The Department seeks comment on whether to make the band 3650-3700 MHz available for license-exempt applications. Comment is also requested on the types of systems and services that could be implemented in the band, and noting the availability of licensed spectrum in the adjacent bands, whether there is a requirement to continue the designation for licensed services in the band.

The Department also seeks comment on the measures which should be introduced for the treatment of incumbent licences in the band, noting the existing policy for the accommodation of FWA services in the band 3500-3650 MHz.

- (1) Are there measures which could be introduced for the operation of licence-exempt devices which would ensure the protection of existing licensed systems?**
- (2) How could such measures be enforced?**
- (3) Should existing licenses be grandfathered indefinitely or should a sunset period apply?**

A comment period of three months from the release of this document will apply.

6.5 Licence-exempt Applications Above 10 GHz

6.5.1 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 that preceded the release of the utilization policy for licence-exempt devices in the band 59-64 GHz, 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 adopted technical rules for the use of the band 57-59 GHz by unlicensed devices, and the Department received representation from the Radio Advisory Board of Canada to adopt a similar designation and technical rules.

In the consultation the Department therefore proposed the adoption of rules to allow licence-exempt devices in the band, noting that several European administrations had adopted technical rules and channel plans for the band for licensed applications. It was further noted that while the use of the band

by licence-exempt devices does not necessarily preclude the introduction of licensed services, it may make sharing difficult.

Comments generally supported the proposal for licence-exempt devices, and there were no representations made about licensable applications. Recognizing the value of harmonizing spectrum use with other countries particularly for applications which involve consumer devices, the Department is adopting 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 cannot cause interference into licensed radio services. As a baseline, the technical requirements should align with those adopted by the FCC for the operation of such devices. Details of the technical requirements for certification and operation will be developed by Industry Canada in consultation with interested parties in an industry forum, and the results incorporated in an appropriate Radio Standards Specification.

Decision:

The Department is adopting 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 cannot cause interference into licensed radio services. The technical requirements for certification and operation will be developed by Industry Canada in consultation with interested parties in an industry forum, and the results incorporated in an appropriate Radio Standards Specification.

6.5.2 Licence-exempt Applications at 90 GHz

In the consultation it was anticipated that the band 92-95 GHz would provide good transmission range for very high-capacity last-mile access applications and computer to computer communications. The Department sought comments on the type of applications which would require access to this spectrum and the time frame for that requirement, the amount of spectrum which would be required and whether portions of the spectrum should be made available on a licensed basis rather than a licence-exempt basis. Very little comment was received on the band and there were no representations made about licensable applications. The Department notes the recent Report and Order issued by the FCC (FCC 03-248) which establishes rules to permit unlicensed indoor use of the band 92-95 GHz on the basis of existing regulations for the band 57-64 GHz.

Decision:

Recognizing the value of harmonizing spectrum use particularly for applications which involve consumer devices:

The Department is adopting a designation in the band 92-94 GHz and 94.1-95 GHz for indoor use by licence-exempt devices on the basis that such devices cannot claim protection from other radio systems and cannot cause interference into licensed radio services. The technical requirements for certification and operation will be developed by Industry Canada, and based on current rules adopted for the band 57-64 GHz, in consultation with interested parties in an industry forum, and the results incorporated in an appropriate Radio Standards Specification.

The Department also notes that in the same proceeding in the US, (FCC 03-248) the bands at 71-76 GHz, 81-86 GHz and 92-95 GHz have been made available for licensed use of fixed services. The licenses are intended to be awarded as non-exclusive and nationwide with rights to access the entire 12.9 GHz of spectrum. Individual station rights would be established by the date and time registration kept in a database. Noting that the allocation changes to these bands which were adopted by the WRC-00 will be treated in a separate review of the Canadian Table, the Department would like to initiate consideration of these bands for similar fixed service applications.

Further Consultation:

The Department seeks comment on the framework, including technical and operational rules which would be required to open the bands 71-76 GHz 81-86 GHz and 92-95 GHz for fixed service operation on a licensed, non-exclusive basis.

- (1) What are the technical and operational limits which should be established to facilitate co-existence:
 - (a) among licensees within the fixed service**
 - (b) with future implementations of co-primary services (FSS, BSS and MS services as applicable)****
- (2) What are the characteristics, data elements and access requirements for a database which could establish rights within an area based on date and time registration?**
- (3) Are there propagation models which could be readily incorporated to develop interference contours and increase sharing efficiencies?**

A comment period of three months from the release of this document will apply.

6.5.3 Licence-exempt Applications at 24.05-24.25 GHz

The band 24.05-24.25 GHz is currently allocated to the radiolocation service on a primary basis and to the amateur service and Earth exploration-satellite service (active) on a secondary basis in the Canadian Table. This band has a designation for use by industrial, scientific, and medical equipment. The lower adjacent band 24.00-24.05 GHz is allocated on a primary basis to amateur and amateur-satellite services and the upper adjacent band 24.25-24.45 GHz has recently been authorized for fixed service applications. For a number of years, the band 24.05-24.25 GHz has been available for licence-exempt devices including field disturbance sensors which are permitted to operate at field strengths up to 2500 mV/m in the band 24.075 - 24.175 GHz.

In the consultation paper, the Department requested comments on new service applications which could be introduced in the band 24.05-24.25 GHz. Respondents expressed little interest in the specific proposal that was made. Some respondents expressed concerns regarding sharing with the secondary allocation for the amateur service. Also, a submission was received from one manufacturer on designating this band for licence-exempt transmission links to align with the US market. The Federal Communications Commission issued a Report and Order (FCC 01-357) in December 2001 amending Part 15 Rules to allow the operation of fixed point-to-point transmitters in the band 24.05-24.25 GHz at field strengths of up to 2500 mV/m (average field strength values measured at 3 meters). The Rules state that transmitters operating at these power levels are required to use highly directional antennas with gains of at least 33 dBi or a main lobe beamwidth (half power points) not exceeding 3.5 degrees to minimize the occurrence of harmful interference to other services in the band. The Rules are intended to

allow the operation of licence-exempt point-to-point transmitters thus allowing for a variety of innovative products and applications in the band.

The Department was urged in the consultation process to consider harmonizing the band 24.05-24.25 GHz for licence-exempt transmission links and set technical standards under Radio Standards Specification 210 (RSS-210). It is important to harmonise the spectrum policy and technical requirements to operate in a regional and global marketplace in order to ensure maximum benefit to Canadians and so that products achieve economies of scale. As well, it is important to encourage the development of innovative radio communications which may further the governments' connectedness agenda.

The Department concluded that opening the band 24.05-24.25 GHz could provide the opportunity for a range of point-to-point transmission facilities to support local broadband distribution and network applications. The decision to make a designation of spectrum in the band 24.05-24.25 GHz to accommodate licence-exempt fixed point-to-point transmission links using highly directional antennas was announced in Notice No. DGTP-005-03 — *Spectrum Designation to Accommodate Licence-Exempt Fixed Point-to-Point Transmission Links in the Band 24.05-24.25 GHz*.

6.5.4 Licence-exempt Applications at 21.2-23.0 GHz

In developing the provisions for the introduction of licence-exempt applications in the band 24.05-24.25 GHz, the Department noted that the band was adjacent to the lower half of a band recently licensed for fixed service applications (24.25-24.45 GHz paired with 25.05-25.25 GHz). It had been indicated that this would be interesting to operators wishing to implement licence-exempt links, initially within an area, taking advantage of the ability to rapidly deploy without the delays typically associated with obtaining a licence. Once network requirements developed to the point where the protection afforded by operating in licensed spectrum was required, the radio could readily be retuned to the licensed spectrum. This has been seen as a means to facilitate the best of both worlds in developing a network. Since that time the Department has become interested in exploring the possibility of facilitating such operation in other bands (i.e. opening a portion of the spectrum within a traditionally licensed fixed service band for license-exempt operation). Systems could be readily retuned to operate in the licensed band by selecting another channel, once authorization for licensed operation had been attained.

In reviewing the bands, the spectrum between 21.2-23.0 GHz looks sufficiently interesting, that the Department is seeking comment on the possibilities at this time.

Currently the 23 GHz plan is divided into three band plans. The first is spectrum which is designated for point-to-point operation in 21.8-22.4 GHz paired with 23-23.6 GHz, and is currently open for licensing. The second is spectrum which is designated for point-to-multipoint operation in 21.2-21.6 GHz paired with 22.4-22.8 GHz, this band has been listed as requiring a future competitive process in order for that band to be opened. The third is spectrum which is designated as reserved in 21.6-21.8 GHz paired with 22.8-23.0 GHz.

Further Consultation:

The Department is seeking comment on the level of interest in opening a portion of this spectrum for license-exempt operation.

- (1) Would spectrum within the point-to-point designation or the point-to-multipoint designation be more appropriate?**
- (2) What technical rules would be required to facilitate co-existence with fixed services as well as other co-primary allocated services in the band?**
- (3) How would cross-border interference/coordination be managed with the US?**

(One possibility would be to only authorize entities capable of becoming radiocommunication carriers to operate license-exempt equipment in the band. Rules could then be established which would avoid the possibility of cross-border interference).

A comment period of three months from the release of this document will apply.

6.6 TV Pick ups and Airborne TV Pick ups

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. Since that time, industry has identified a need for TV-pickup operations from airborne platforms transmitting to receivers on the ground. Anticipating that coexistence with the fixed service systems would be difficult due to the large area over which these systems would operate, the Department sought comment on whether suitable additional spectrum for these applications could be found in the existing video distribution band at 8275-8500 MHz or the current TV pick-up band 6930-7125 MHz and whether these applications could share with LE devices.

Comment on the band 8275-8500 MHz from both the RABC and the Canadian Association of Broadcasters (CAB) expressed concern for the existing TV distribution systems, and cited a lack of equipment for the band that would not likely be remedied for a Canadian only market.

Comments on the band 6930-7125 MHz cited congestion of current TV pick-up use in the major markets as an impediment to the introduction of operations from airborne platforms. The Department does not agree with these observations since it would be possible for individual broadcasters operating TV pick-ups to decide whether to use a channel in a terrestrial or airborne mode, or both, at any particular time. Further, congestion for these applications is compounded by the slow development and acceptance of digital equipment. However, more sympathy is extended to the argument submitted on behalf of NGSO MSS feeder link operation in the space-to-Earth direction (receiving earth terminals) which could potentially receive interference airborne operation over large distances.

There was no support in the comments for these applications to be accommodated in LE spectrum.

Decision:

The Department will not make designations for TV pick-ups operating from airborne platforms at this time.

6.7 31.8-33.4 GHz

The frequency range 31.8-33.4 GHz 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 high-density fixed service (HDFS) in footnote 5.547. It was noted in the consultation that this band is one of very few bands allocated internationally and in all regions that the fixed service does not share on a co-primary basis with the fixed-satellite service. It would therefore be well suited for 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 therefore fits 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).

Comment was requested on possible applications which would make use of this spectrum and the anticipated time frame in which this spectrum would be required.

While there was some support expressed for opening this spectrum for applications such as those currently being implemented in Europe, others advocated delaying the designation of applications until there is a clearer picture of the requirements.

The Department tends to agree with the latter, noting the amount of spectrum above 20 GHz that is currently available for fixed applications.

Future Consultation:

The Department will make the band 31.8-33.4 GHz available for HDFS with the precise definition of applications in a future policy and licensing framework consultation.

6.8 Footnote C44 24.75-25.225 GHz

Although not discussed in the consultation, comments were received relating to several aspects of domestic footnote C44. The first is the submission by Telesat anticipating that the 24.75-25.25 GHz band might be used for other signals associated with the BSS in addition to the feeder link signals, in other words, innovative services requiring a degree of interactivity which could involve transmissions from ubiquitous earth stations.

Telesat therefore proposed a modification to the first sentence to read:

“The use of the fixed-satellite service (Earth-to-space) in the band 24.75-25.25 GHz is limited to feeder links to broadcasting-satellite space stations, or to other digital carriers in the fixed-satellite service that are associated with the broadcasting-satellite service, operating in the band 17.3-17.8 GHz.”

The second proposal from Telesat was to urge the Department neither to award any additional fixed service licences in the 24.75-25.25 GHz band, nor to re-allocate any forfeited fixed service licences in the 24.75-25.25 GHz band on the basis that that substantial limitations will be imposed on where feeder link stations may be located, particularly since the fixed service is licensed on an area basis, for ubiquitous FS deployments.

The Department notes that both these comments pertain to the entire 500 MHz allocated for FSS use in the band 24.75-25.25 GHz whereas the restrictions placed on the FSS with respect to the fixed service in FN C44 is for 200 MHz in the band 25.05-25.35 GHz.

There remains 300 MHz of spectrum from 24.75-25.05 MHz for which there is no fixed service allocation. The determination to partition the spectrum in this manner was made in the original policy and licensing framework for services in this band prior to the auction of this spectrum. The restriction of FSS use to feeder links for the BSS remains an issue since it does not include allowances for ubiquitous deployments, however it is beyond the immediate scope of this consultation and should be dealt with in a future consultation related to the provision and licensing of BSS services.

The third issue raised by the RABC was a proposal to align C44 with the intent of the FCC footnote NG167 which restricts the FSS use of the band 24.75-25.25 GHz to feeder links for BSS operating at 17.3-17.7 GHz, rather than prescribe the use of 25 GHz for feeder links for BSS operating at 17.3-17.8 GHz as in C44.

While NG167 apparently allows BSS at 17 GHz to use spectrum other than 25 GHz for feeder links, the band at 25 GHz is still restricted to use for BSS at 17 GHz. It is also noted that in the US domestic table there is no allocation for FSS in the Earth-to-space direction in the band 17.9-18.4 GHz so the point appears to be moot since the choices for feeder link spectrum for BSS are even more restricted.

Canadian Domestic Footnote:

C44 (CAN-00) Feeder links to broadcasting-satellite space stations operating in the band 17.3 -17.8 GHz shall be implemented in the band 24.75-25.25 GHz. In areas where fixed systems have been licensed using a competitive process, future earth stations (Earth-to-space) in the band

25.05-25.25 GHz will be permitted provided that such installations will not cause interference to any fixed service to be deployed in the authorized service area.

US Domestic Footnote:

NG167 The use of the fixed-satellite service (Earth-to-space) in the band 24.75-25.25 GHz is limited to feeder links for the broadcasting-satellite service operating in the band 17.3-17.7 GHz. The allocation to the fixed-satellite service (Earth-to-space) in the band 24.75-25.25 shall come into effect on 1 April 2007.

Future Consultation:

While it was not raised in the 3-30 GHz consultation itself, the Department will address footnote C44 in a future consultation relating to the provision and licensing of BSS services.

6.9 Review of Broadband Spectrum Cap Applicable to the Bands 24, 28, and 38 GHz

In May 1999 the *Policy and Licensing Procedures for the Auction of the 24 and 38 GHz Frequency Bands*, (DGRB-003-99/DGTP-005-99) was released to facilitate the timely and orderly implementation of broadband wireless telecommunications in Canada. Among the various policy provisions, the document established a spectrum cap (or spectrum aggregation limit) to foster competition in the provision of broadband facilities and services. The Department concluded that certain spectrum limits were required to stimulate competition and consequently provide the possibility for new broadband services.

In the [Framework for Spectrum Auctions in Canada](http://strategis.ic.gc.ca/epic/internet/insmt-gst.nsf/en/sf01626e.html) publication (found at: <http://strategis.ic.gc.ca/epic/internet/insmt-gst.nsf/en/sf01626e.html>), the Department expressed that when multiple licences in a given geographic area are auctioned, and can be used to provide closely substitutable services, limits on the amount of spectrum that any single bidder is allowed to acquire may be required to ensure competitive markets. Moreover, the Department established that, “aggregation limits may be imposed in the following circumstances:

- (a) a bidder that acquires an amount of spectrum beyond a certain level would not face effective competition from providers of closely substitutable services provided by firms that use infrastructure other than the spectrum being auctioned; and
- (b) the anti-competitive effects arising from the acquisition of an amount of spectrum beyond a certain level by a single bidder would not be offset by lower costs or higher valued services resulting from having a single entity hold this amount of spectrum.”

The Department established the spectrum cap as follows:

- In a given service area, any entity (and its affiliates) *other* than an incumbent local exchange carrier (ILEC), whose local exchange area overlaps that area, may hold up to 1000 MHz in spectrum licences

in the Local Multipoint Communication Systems (LMCS) 28 GHz band **OR** up to 600 MHz in spectrum licences in the LMCS 28 GHz band **and** the 24 or 38 GHz bands; and,

- An ILEC (and its affiliates) in an area which is overlapped by its local exchange area, may hold up to 200 MHz in spectrum licences in the LMCS 28 GHz band **OR** up to 200 MHz in spectrum licences in the LMCS 28 GHz band **and** the 24 GHz or 38 GHz bands.

Refer to Sections 2.3.5 of the *Policy and Licensing Procedures for the Auction of the 24 and 38 GHz Frequency Bands* (DGRB-003-99/DGTP-005-99) for further information.

The policy stated that these broadband spectrum cap limits would be reviewed when a subsequent licensing process was announced for other wireless broadband spectrum or three years following the close of the auction, whichever came first. Moreover, depending on the degree to which competition had developed in the local broadband services marketplace, as evidenced by factors such as the concentration of market shares or the availability of choice of local broadband services, the Department could modify or remove the established limits.

Three years have passed since the establishment of the spectrum cap. The Department had anticipated that with a diversity of service providers, resulting from the 1999 auction, Canadians would be well served with new broadband services. Unfortunately, the roll-out of wireless broadband facilities using these spectrum resources have been minimal. Moreover, the LMCS 28 GHz spectrum (1000 MHz) has been returned to the Department.

In light of the present limited use of the spectrum in the bands 24, 28 and 38 GHz and the recent addition of spectrum available for the purpose of broadband internet access and local distribution (i.e. at 2.3 GHz, 2.5 GHz and 3.5 GHz), the Department deems there to be ample spectrum available for the provision of such services. Furthermore, the Department recognizes that a number of other technologies are also available for the delivery of similar services. The Department is of the view that there now exists an opportunity for competition and delivery of a choice of services and that the spectrum cap is no longer required.

Further Consultation:

The Department seeks comments, with supporting rationale, on the proposal to rescind the spectrum cap for the bands 24, 28 and 38 GHz.

A comment period of three months from the release of this document will apply.

7.0 Consequential Changes to the Canadian Table of Frequency Allocations

Based on the decisions made in the spectrum utilization policies, a number of changes are required in the *Canadian Table of Frequency Allocations*. These changes include new or modified domestic footnotes to describe the inter-relationship between co-primary allocated services in certain bands. Since these footnotes are intended to reflect the decisions made in the utilization policies, comments, if any, should be directed at the language used rather than the overall intent. The comment period specified in the gazette notice announcing the release of this document will apply to these changes, after which time they will be incorporated into the Canadian Table at the earliest opportunity.

The proposals contained in this section are identified as modifications to the *Canadian Table of Frequency Allocations*, last revised as a result of WRC-00. (The current version of the Canadian Table may be obtained from the [Spectrum Management and Telecommunications Web site](http://strategis.ic.gc.ca/epic/internet/insmt-gst.nsf/vwGeneratedInterE/h_sf01678e.html) at: http://strategis.ic.gc.ca/epic/internet/insmt-gst.nsf/vwGeneratedInterE/h_sf01678e.html.)

ADD	indicates an international footnote created at WRC-03 or a proposed new Canadian footnote.
SUP	indicates an international footnote suppressed at WRC-03 or a Canadian footnote proposed for suppression.
MOD	indicates an international footnote modified at WRC-03 or a Canadian footnote proposed for modification. These appear in both the Table and in the lists of footnotes.
Strikeout	indicates the proposed removal of a radio service or footnote, or removal of specific text within a Canadian footnote.
<u>Underlining</u>	indicates the proposed addition of a radio service or footnote, or removal of specific text within a Canadian footnote.
CAN ZZ	identifies a Canadian footnote.
5.XXX	identities an international footnote.

Note: The text of international footnotes is not open for consideration in this discussion paper and consequently the modifications to footnotes made at WRC-03 are incorporated but not identified.

7.1 Changes to the Band 4500-4990 MHz

In line with the spectrum policy decisions made in Sections 3.2.1 and 3.2.2, the following changes to the Canadian Table are required.

4 400-4 500	FIXED <u>MOBILE</u> MOD C25
4 500-4 800	FIXED <u>MOBILE</u> FIXED-SATELLITE (space-to-Earth) 5.441 MOD C25 MOD C16A
4 800-4 825	FIXED <u>MOBILE</u> Radio Astronomy <u>C25</u>
4 825-4 835	FIXED <u>MOBILE</u> 5.442 RADIO ASTRONOMY 5.443 5.149 <u>C25</u>
4 835-4 950	FIXED <u>MOBILE</u> Radio Astronomy MOD C25
4 950-4 990	FIXED <u>MOBILE</u> 5.442 RADIO ASTRONOMY 5.443 5.149 5.339 <u>C25</u>

Footnote: MOD C25 for the Band 4400-4940 MHz

MOD C25 The bands 4 460—4 540 MHz and 4 900—4 990 MHz are also band 4400-4940 MHz is allocated to the fixed and mobile services on a primary basis, for the exclusive use of the Government of Canada.

MOD 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. In the band 4500-4800 MHz the use of the fixed and mobile services by the Government of Canada in the vicinity of major military bases has priority over the use of the fixed-satellite service. The use of the fixed-satellite service in this band shall be limited to applications that pose minimal constraints on the deployment of fixed and mobile service systems by the GoC in the vicinity of major military bases.~~

EXISTING Radio Astronomy Footnote:

5.442 In the bands 4 825-4 835 MHz and 4 950-4 990 MHz, the allocation to the mobile service is restricted to the mobile, except aeronautical mobile, service.

7.2 Changes to the Band 5850-7075 MHz

5 850-5 925	<p>FIXED <u>MOBILE</u> FIXED-SATELLITE (Earth-to-space) Amateur Radiolocation</p>
5 925-6 700	<p>FIXED FIXED-SATELLITE (Earth-to-space)</p> <p>5.149 5.440 5.458</p>
6 700-7 075	<p>FIXED FIXED-SATELLITE (Earth-to-space) (space-to-Earth) 5.441 C40</p> <p>5.458 5.458A 5.458B 5.458C <u>C16A</u></p>

Further Consultation:

Comment is sought in on the proposal (Section 3.4) for a domestic footnote to ensure that DSRC systems in the FS and MS services have priority over FSS operations in the band 5850-5925 MHz.

C16X In the band 5850-5925 MHz the use of the fixed and mobile services has priority over the use of the fixed-satellite service. The use of the fixed-satellite service in this band shall be limited to applications that pose minimal constraints on the deployment of fixed and mobile service systems. An example of such an application would be the use of a small number of large aperture earth stations, taking into account existing and potential service areas for ubiquitous deployment of fixed and mobile service systems.

A comment period of three months from the release of this document will apply.

7.3 Changes to the Band 10.7-13.25 GHz

10.7-11.7	FIXED FIXED-SATELLITE (space-to-Earth) 5.441 5.484A C41 C16 C16A C16C C16B
11.7-12.2	FIXED-SATELLITE (space-to-Earth) 5.484A 5.485 5.486 5.488 C16B
12.2-12.7	BROADCASTING BROADCASTING-SATELLITE C43 C47 FIXED FIXED-SATELLITE (space-to-Earth) 5.487A 5.488 5.490 5.492 C16B
12.7-12.75	FIXED FIXED-SATELLITE (Earth-to-space)

12.75-13.25	FIXED FIXED-SATELLITE (Earth-to-space) 5.441 C16A C16C
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7.4 Changes to the Band 13.75-14.0 GHz

13.75-14	FIXED-SATELLITE (Earth-to-space) 5.484A C41 RADIOLOCATION Standard Frequency and Time Signal-Satellite (Earth-to-space) <u>Earth exploration-satellite</u> MOD 5.502 MOD 5.503 5.503A C16B
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MOD 5.502 (WRC-03) In the band 13.75-14 GHz, an earth station of a geostationary fixed-satellite service network shall have a minimum antenna diameter of 1.2 m and an earth station of a non geostationary fixed-satellite service system shall have a minimum antenna diameter of 4.5 m. In addition, the e.i.r.p., averaged over one second, radiated by a station in the radiolocation or radionavigation services shall not exceed 59 dBW for elevation angles above 2° and 65 dBW at lower angles. Before an administration brings into use an earth station in a geostationary-satellite network in the fixed-satellite service in this band with an antenna size smaller than 4.5 m, it shall ensure that the power flux-density produced by this earth station does not exceed:

- 115 dB(W/(m² · 10 MHz)) for more than 1% of the time produced at 36 m above sea level at the low water mark, as officially recognized by the coastal state;
- 115 dB(W/(m² · 10 MHz)) for more than 1% of the time produced 3 m above ground at the border of the territory of an administration deploying or planning to deploy land mobile radars in this band, unless prior agreement has been obtained.

For earth stations within the fixed-satellite service having an antenna diameter greater than or equal to 4.5 m, the e.i.r.p. of any emission should be at least 68 dBW and should not exceed 85 dBW.

MOD 5.503 (WRC-03) In the band 13.75-14 GHz, geostationary space stations in the space research service for which information for advance publication has been received by the Bureau prior to 31 January 1992 shall operate on an equal basis with stations in the fixed-satellite service; after that date, new geostationary space stations in the space research service will operate on a secondary basis. Until those geostationary space stations in the space research service for which information for advance publication has been received by the Bureau prior to 31 January 1992 cease to operate in this band:

- in the band 13.770-13.780 GHz, the e.i.r.p. density of emissions from any earth station in the fixed-satellite service operating with a space station in geostationary-satellite orbit shall not exceed:
 - (i) $4.7D + 28 \text{ dB(W/40 kHz)}$, where D is the fixed-satellite service earth station antenna diameter (m) for antenna diameters equal to or greater than 1.2 m and less than 4.5 m;
 - (ii) $49.2 + 20 \log(D/4.5) \text{ dB(W/40 kHz)}$, where D is the fixed-satellite service earth station antenna diameter (m) for antenna diameters equal to or greater than 4.5 m and less than 31.9 m;
 - (iii) $66.2 \text{ dB(W/40 kHz)}$ for any fixed-satellite service earth station for antenna diameters (m) equal to or greater than 31.9 m;
 - (iv) 56.2 dB(W/4 kHz) for narrow-band (less than 40 kHz of necessary bandwidth) fixed-satellite service earth station emissions from any fixed-satellite service earth station having an antenna diameter of 4.5 m or greater;
- the e.i.r.p. density of emissions from any earth station in the fixed-satellite service operating with a space station in non-geostationary-satellite orbit shall not exceed 51 dBW in the 6 MHz band from 13.772 to 13.778 GHz.

Automatic power control may be used to increase the e.i.r.p. density in these frequency ranges to compensate for rain attenuation, to the extent that the power flux-density at the fixed-satellite service space station does not exceed the value resulting from use by an earth station of an e.i.r.p. meeting the above limits in clear-sky conditions.

SUP 5.503A

Provisional Changes:

The Department is provisionally adopting the changes to the regulations made at WRC-03 which will facilitate the operation of transmitting earth stations with antenna diameters as small as 1.2 meters in the band 13.75-14.0 GHz under the restrictions prescribed in the regulations.

A comment period of 30 days from the release of this document will apply to these provisional changes. In the absence of compelling arguments to the contrary, these changes will be incorporated in the *Canadian Table of Frequency Allocations*.

7.5 Changes to the Band 17.8-19.7 GHz

<p>17.8-18.1</p>	<p>FIXED FIXED-SATELLITE (space-to-Earth) (Earth-to-space) 5.484A 5.516</p> <p>C16A C43 C47 <u>C16D</u></p>
<p>18.1-18.4</p>	<p>FIXED FIXED-SATELLITE (space-to-Earth) (Earth-to-space) 5.484A 5.520</p> <p>5.519 C16A C43 C47 <u>C16D</u> <u>C16E</u></p>
<p>18.4-18.6</p>	<p>FIXED FIXED-SATELLITE (space-to-Earth) 5.484A</p> <p>C16A <u>C16E</u></p>
<p>18.6-18.8</p>	<p>EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) 5.522B SPACE RESEARCH (passive)</p> <p>5.522A C16A <u>C16E</u></p>
<p>18.8-19.3</p>	<p>FIXED FIXED-SATELLITE (space-to-Earth) 5.523A</p> <p>C16A <u>C16E</u></p>
<p>19.3-19.7</p>	<p>FIXED FIXED-SATELLITE (space-to-Earth) (Earth-to-space) 5.523B 5.523C 5.523D 5.523E</p> <p>C16A <u>C16D</u> <u>CYY</u></p>

ADD C16D In the bands 17.8-18.3 GHz and 19.3-19.7 GHz use of the fixed service has priority over use of the fixed-satellite service in the space-to-Earth direction. Use of the fixed-satellite service in this band shall be limited to applications that pose minimal constraints on the deployment of fixed services. An example of such an application would be the use of a small number of large aperture earth stations, taking into account existing and potential service areas for ubiquitous deployment of fixed service systems.

ADD C16E In the band 18.3-19.3 GHz use of the fixed-satellite service has priority over use of the fixed service. Use of the fixed service in this band shall be limited to applications that pose minimal constraints on the deployment of fixed-satellite services. Domestic implementation of fixed-satellite services in the band 18.8-19.3 GHz will be governed by spectrum utilization policies to be developed. These policies will take regional developments into consideration in the designation and authorization of spectrum for particular systems and technologies.

Note: Based on the decisions made in this document, footnote CXX (CAN 01) will not be incorporated in the Canadian Table.

~~**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).~~

It is the intention of the Department to incorporate these changes in the Canadian Table, however comment will be accepted on improvements to the language. The comment period specified in the gazette notice announcing the release of this document will apply to these changes. In the absence of compelling arguments to the contrary, these changes will be incorporated as presented.

Provisional Changes:

The Department provisionally removes the allocation to FSS in the Earth-to-space direction in the band 19.3-19.7 GHz.

The Department provisionally adopts a footnote in the Canadian Table as follows:

CYY The use of the band 19.3-19.7 GHz for fixed-satellite services (space-to-Earth) is limited to feeder links for the mobile-satellite service.

A comment period of 30 days from the release of this document will apply to these provisional changes. In the absence of compelling arguments to the contrary, these changes will be incorporated in the *Canadian Table of Frequency Allocations*.

7.6 Changes to the Band 27.5-29.5 GHz

27.5-29.5	FIXED FIXED-SATELLITE (Earth-to-space) 5.484A 5.523A 5.523C 5.523E 5.535A 5.539 5.541A MOBILE 5.538 5.540 C16A C47A <u>C16F</u> <u>C16G</u> <u>CZZ</u>
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ADD C16F In the bands 28.35-29.1 GHz and 29.25-29.5 GHz use of the fixed-satellite service has priority over use of the fixed service. Use of the fixed service in this band shall be limited to applications that pose minimal constraints on the deployment of fixed-satellite services. Domestic implementation of fixed-satellite services in the band 28.6-29.1 GHz will be governed by spectrum utilization policies to be developed. These policies will take regional developments into consideration in the designation and authorization of spectrum for particular systems and technologies.

ADD C16G In the band 29.1-29.25 GHz use of the fixed service has priority over use of the fixed-satellite service. Use of the fixed-satellite service in this band shall be limited to applications that pose minimal constraints on the deployment of fixed services. An example of such an application would be the use of a small number of large aperture earth stations, taking into account existing and potential service areas for ubiquitous deployment of fixed service systems.

Note: Based on the decisions made in this document, footnote CXX (CAN 01) will not be incorporated in the *Canadian Table of Frequency Allocations*.

~~**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).**~~

Provisional Changes:

The Department provisionally adopts a footnote in the Canadian Table as follows:

CZZ The use of the band 29.1-29.25 GHz by the fixed-satellite service (Earth-to-space) is limited to feeder links for the mobile-satellite service.

A comment period of 30 days from the release of this document will apply to these provisional changes. In the absence of compelling arguments to the contrary, these changes will be incorporated in the *Canadian Table of Frequency Allocations*.

Appendix A - Definitions of Short Forms and Acronyms Referred to in SP 3-30 GHz

AWS	Advanced Wireless Service
BSS	broadcast-satellite service
C band	Refers to frequencies in the range between 3700 and 7025 MHz
CAB	Canadian Association of Broadcasters
CARS	Cable Television Relay Service
CATV	cable television
CCTA	Canadian Cable and Television Association
CEC	Cooperative Engagement Capability
DEMS	Digital Electronic Messaging Systems
DND	Department of National Defence
DSRC	Dedicated Short Range Communications
FCC	Federal Communications Commission
FL	feeder links
FS	fixed service
FSS	fixed-satellite service
FWA	Fixed Wireless Access
GoC	Government of Canada
GSO	geostationary satellite orbit
HAPS	High Altitude Platform Stations
HC	High Capacity (traffic rates > 51.840 Mb/s)
HDFS	high-density fixed service
ISM	industrial, scientific and medical
ITS	Intelligent Transportation Systems
Ka band	Refers to frequencies in the ranges 19.7-20.2 GHz and 27.5-30.0 GHz
Ku band	Refers to frequencies within the range 10.7 GHz - 14.5 GHz
LC	Low Capacity (traffic rates ≤ 1.544 Mb/s ≤ 24.704 Mb/s)
LE	Licence Exempt
LEO	low-Earth orbiting
LMCS	Local Multipoint Communications Systems
LMDS	Local Multipoint Distribution Systems
MC	Medium Capacity (traffic rates > 24.704 Mb/s ≤ 51.840 Mb/s)
MCS	Multipoint Communications System
MS	mobile services
MSS	mobile-satellite service

MSS FL	Mobile Satellite Service Feederlinks
NGSO	non-geostationary satellite orbit
NPRM	Notice of Proposed Rule Making (FCC document)
PCS	Personal Communications Service
PFD	power flux-density
PSTN	Public Switched Telephone Network
RABC	Radio Advisory Board of Canada
RP-008	<i>Policy Framework for the Provision of Fixed-satellite Services</i>
RP-015	<i>Microwave Licensing Policy Respecting Carriage of Program Signals to Broadcasting Undertakings</i>
RP-020	<i>Guidelines on the Licensing Process and Spectrum Release</i>
RP-022	<i>Microwave Licensing Policy Framework</i>
RPV	remote piloted vehicles
SCADA	system control and data acquisition
SNG	satellite news gathering
SP 1-20 GHz	<i>Revisions to Microwave Spectrum Utilization Policies in the Range of 1-20 GHz</i>
SP-GEN	<i>General Information Related to Spectrum Utilization and Radio Systems Policies</i>
SRSP	Standard Radio System Plan
STL	studio transmitter links
TDD	time division duplex
TLRCT	Tactical Long-Range Communications Terminals
UWB	ultra-wide band
VHCM	Very High-capacity Microwave
VLC	Very Low Capacity (traffic rates < 1.544 Mb/s)
VSAT	Very Small Aperture Terminal
WARC-92	1992 World Administrative Radiocommunication Conference
WCS	Wireless Communications Service
WRC-03	World Radio Conference 2003
WTO	World Trade Organization