Multipoint Communications Systems (MCS) in the 2500 MHz Range

Spectrum and Licensing Policy Discussion Document

December 12, 1997

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1. Introduction

The purpose of this document is to consult on a number of issues related to licensing Multipoint Communications Systems (MCS) in the band 2500-2596 MHz across Canada. Industry Canada is seeking public comments which will assist in the formulation of the spectrum policy framework and licensing approach.

Industry Canada has received, over a short period of time, a large number of radio applications for the development of MCS at 2500 MHz having varying numbers of requested channels and various sizes of service areas. In several large urban centres, these requests far exceed the 16 channels that are available in the band. While the Department normally assigns radio frequency spectrum on a first-come, first-served basis, in instances where the expressed demand for spectrum exceeds the amount of spectrum available, the Department has previously employed competitive licensing processes to select licensees, in accordance with stated policy. Further, in Gazette Notice DGTP-009-97 released on the same date as this consultation document, the Department issued a paper discussing proposals for dealing with applications on a first-come, first-served basis. Within this paper, the Department has clarified that while the first-come, first-served licensing process will still be used to handle the large majority of licence applications, the utilization of competitive licensing processes is clarified for certain specific situations. As well, general rules concerning the identification of situations for using competitive licensing processes are presented for public comment.

As a result, in accordance with previous policy and practice and with the proposals contained in Gazette Notice DGTP-009-97, the Department intends to utilize a competitive licensing process to authorize MCS in this band. Given that the consultations on the use of spectrum auctions are not yet complete, the Department has determined from the interest shown and number of applications received that the comparative licensing process may be the most appropriate and expeditious way to proceed in the authorization of MCS in this band. With a comparative process, where a call for applications results in there being sufficient spectrum to accommodate the demand, such applications may be licensed on a first-come, first-served basis.

Hence, Industry Canada is announcing that there is a moratorium on the authorization of all systems in the band 2500-2596 MHz. After consultation on the issues raised in this paper, Industry Canada proposes to move quickly with a final policy framework and call for applications.

2. Background

The frequency band 2500-2596 MHz has been available for MCS applications for many years under the provisions found in Spectrum Utilization Policies SP 1-20 GHz (SP 1-20 GHz), *Microwave Spectrum Utilization Policies in the Range of 1-20 GHz*. Until recently, the Department had received relatively few comprehensive applications for the development of MCS this band. However, the prospect of increased competition in the provision of local telecommunication and broadcasting distribution services, the demand for Internet service,

and advances in digital MCS technology have provided new business opportunities in the use of this band.

Within this band, 2500-2596 MHz, there are sixteen 6 MHz channels available for assignment. Under the provisions of SP 1-20 GHz, the types of MCS systems permitted in this band include one-way and two-way video and data services (e.g. instructional TV, video conferencing, multi-media applications). Also the current frequency assignment process is based on individual site licensing. Both Canada and the United States use this spectrum for multipoint systems under the terms of an arrangement which provides for frequency sharing in the border areas. This arrangement is currently being updated to take into account the deployment of digital systems.

Interested parties have approached the Department with preliminary requests to develop a variety of one-way and two-way MCS systems using one or more MCS channels. In some instances business plans call for the use of all 16 channels for video and data services, while in others, the available technology would permit the delivery of voice and data services in a single channel. Some of the applications are for wide-area MCS licences of a regional or provincial scale, while other potential applications may require MCS licences to serve relatively small areas.

3. General Telecommunications Policy

The Minister, in exercising his powers under the *Radiocommunication Act*, may have regard to the policy objectives set out in the *Telecommunications Act*. The *Telecommunications Act* establishes several objectives of particular relevance to wireless telecommunications services which can be provided using MCS. As well, the Department has been guided by the objectives of the government's Information Highway strategy. Wireless communications are already playing a key role in advancing the capability of Canada's Information Highway as well as being a component in helping to achieve the goal of making Canada the most connected country in the world. It is the government’s view that connecting Canadians is key to Canada’s future success in the knowledge-based economy.

In dealing with MCS radio applications for the distribution of both telecommunications and video services, Industry Canada intends to issue spectrum licences under the provisions of the *Radiocommunication Act*. Spectrum licences, also referred to as block area licences, provide for the utilization by licensees of specified radio frequencies within a defined geographic area. With a spectrum licence, site-specific radio station licences are not required for each radio installation, however, successful applicants must still obtain all other appropriate approvals associated with individual sites. As well, licensees will be expected to respect Industry Canada's policy of encouraging shared use of advantageous antenna sites. Furthermore, the provision of services to the public would be within the oversight of the *Telecommunications Act*, and may be subject to the provisions of the *Broadcasting Act* should the services carried be determined to constitute broadcasting.

It is expected that many of the telecommunications services carried on MCS may require interconnection to public telecommunications networks. The Canadian Radio-television and Telecommunications Commission (CRTC), and in Saskatchewan, the relevant provincial authority, are responsible for approving the terms and conditions of interconnection for access to the public networks. Interconnection standards may be required to facilitate the interconnection with public switched networks and the Terminal Attachment Program Advisory Committee (TAPAC) may be asked to develop any necessary standards.

Canadians have clearly expressed, in a number of fora, that they value their privacy. The possible use of radiocommunications (in MCS) to effect the link between the communications of individual consumers and the conventional public switched telephone network (or other networks) has obvious ramifications for the privacy concerns of users. MCS operators should consider measures to ensure that privacy concerns are addressed.

As well, Industry Canada has in certain past licensing activities ensured that law enforcement agencies have the capability to continue their lawful interception activities and the Solicitor General of Canada has, to this end, released a set of assistance capability requirements that encompass police agency needs. Industry Canada intends to continue this practice for MCS at 2500 MHz by requiring that such licensees provide for and maintain lawful interception capabilities as authorized by law through a condition of licence. As in past practice, Industry Canada will consider requests for forbearance from certain of these capabilities for a limited period where, in the opinion of the Minister of Industry and in consultation with the Solicitor General, the requirement(s) is (are) not reasonably achievable. Interested parties should contact the offices of the Solicitor General to obtain a copy of their document entitled "Solicitor General's Enforcement Standards for Lawful Interception of Telecommunications" which defines their requirements for lawful interception.

4. Policy Proposals

Given the range of MCS applications, technologies, service areas and frequency channel requirements, Industry Canada is seeking views on revisions to the spectrum utilization policy provisions found in SP 1-20 GHz as well as related issues in order to better accommodate emerging MCS systems. The following proposal is based on the information available to the Department at this time and attempts to accommodate the known needs of potential MCS service providers while ensuring there is sufficient opportunity for competitive service offerings. *Interested parties are invited to respond to the following policy proposals for MCS in the band 2500-2596 MHz.*

4.1 Spectrum Structure and Use

(i) Frequency assignments in the 2500-2596 MHz MCS band will be authorized on a block-area basis using a spectrum licence. The proposed spectrum blocks are described in Figure 4.1. The existing 6 MHz channels have been aggregated into three groups of four channels, one group of two channels and two groups of one channel in order to meet the diversity of

spectrum requirements for various MCS system capacities. The Department may establish alternate arrangements in certain geographical areas to account for existing MCS systems. A spectrum block will be assigned to only one licensee in a given area.

The requirement to provide service over potentially large areas and the need to deploy transmission facilities on an 'as required' basis suggests that the block-area approach using a spectrum licence is most suitable for licensing MCS in this band. There is no change to the current 6 MHz channelization in order to retain alignment with the existing channel plan found in Standard Radio System Plan 302.5 (SRSP-302.5), *Technical Requirements for Stations in the Fixed Services Operating in the 2500-2686 MHz Band*, and to facilitate cross border coordination with the United States using the current understanding.

From the information available to the Department, including the expressions of interest received more recently, it is clear that a significant number of potential MCS service offerings require more than one spectrum block. In order to provide sufficient spectrum for a full range of applications while permitting access to the 2500 MHz band by as many operators as possible, the Department has proposed to divide the band as shown in Figure 4.1. A key point in this proposal in the licensing process is the limit of one spectrum block of any size for a given MCS licensee or affiliate per service area.

The six spectrum blocks were selected on the basis that they appeared to best meet the known service requirements which include one-way and two-way transmission and a diversity of distribution capacities. It was assumed that there would be technical and efficiency advantages to provide contiguous channels in each block. The four spectrum blocks have been interleaved with the one and two spectrum blocks on the basis that adjacent channel coordination becomes less complex.

Figure 4.1 MCS Band Proposed Channel Grouping

Block Designator	Frequency (MHz)
D	2500-2506 2506-2512
A	2512-2518 2518-2524 2524-2530 2530-2536
E	2536-2542
B	2542-2548 2548-2554 2554-2560 2560-2566
F	2566-2572
C	2572-2578 2578-2584 2584-2590 2590-2596

(ii) One-way and two-way MCS systems will continue to be permitted. In-band spectrum within each block may be used for return traffic to the hub station provided that this use does not affect the use of adjacent spectrum blocks.

The current spectrum utilization policy SP 1-20 GHz permits both one-way and two-way MCS systems in the 2500 MHz band. There does not appear to be a need to limit forward and return spectrum use. However, in continuing to permit two-way systems, it is important to ensure that such systems do not cause impediments to other MCS systems. See Section 4.7.3 for a description of technical co-existence issues.

(iii) MCS systems in the 2500 MHz band shall make exclusive use of digital technology.

Digital radio systems are available for this band. The use of digital technology may lead to a more efficient use of the modest amount of spectrum available in the 2500-2596 MHz band.

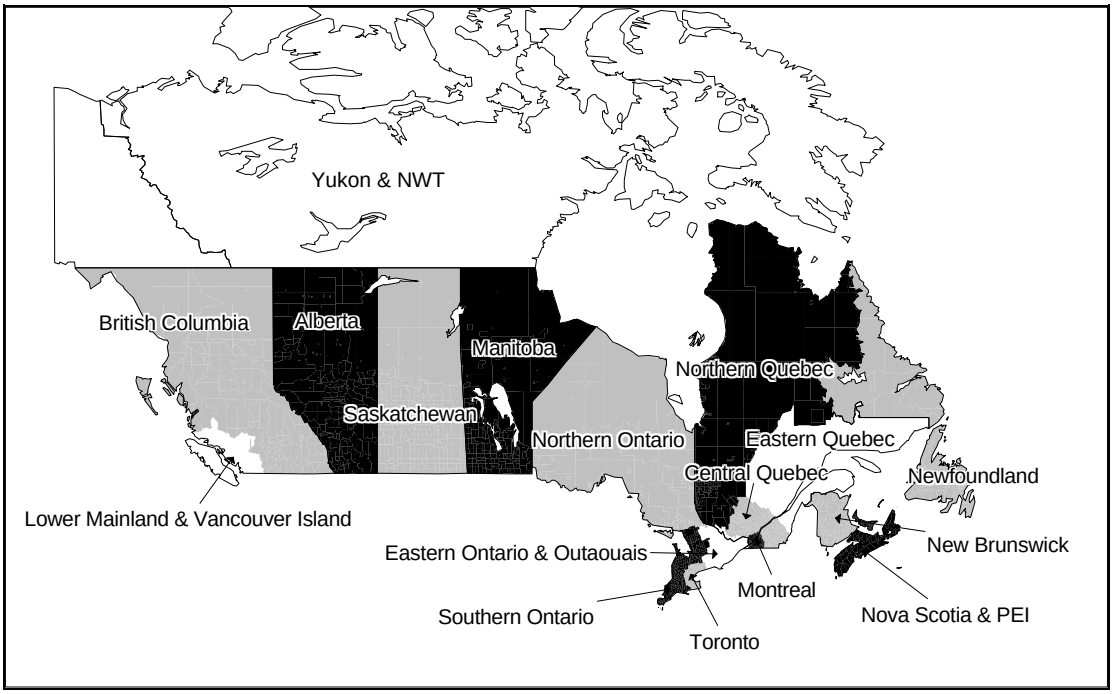
(**iv) Licensees should have a choice of digital radio equipment, however, certain system design parameters may be necessary to reduce the potential of interference between MCS systems.**

Licensees should be free to select digital radio equipment that best meets their service requirements. Recently, the Department has provided similar flexibility for MCS and point-to-point systems in the 23 GHz and 38 GHz bands respectively. It is, however, necessary to establish technical limits to ensure interference-free operation of systems between adjacent spectrum blocks in the same area and co-channel blocks in adjacent areas. See Section 4.7 for a discussion of technical issues.

4.2 Service Area Definitions

Industry Canada is seeking views on the proposed service areas indicated in Figure 4.2. This proposal divides Canada into 17 contiguous service areas along census subdivision lines, varying from relatively small to very large. Detailed definitions of these service areas can be found at http://strategis.ic.gc.ca/spectrum or by contacting the Department as outlined in Section 6.

Figure 4.2



In crafting these service areas, consideration was given to the known demand to date, the actions of the CRTC in licensing MDS spectrum in the adjacent frequency band, 2596 to 2686 MHz, and the desire to commence and complete licensing for MCS systems for all areas of Canada as quickly as possible. The Department notes that some parties may desire smaller or larger service area definitions and given the known demand to date, it is apparent that there is no one perfect service area solution for all.

Given the desire to quickly proceed to licensing, followed by the timely introduction of services, it is recognized that there is a trade off with respect to time in utilizing smaller versus larger service areas. Specifically, the more service areas and the more submissions that must be evaluated by the Department, the more time it will take to complete licensing. On the other hand, with larger service areas, while the authorization process may be quicker, this is done at the expense of effectively accommodating requests for smaller service areas. In these cases, flexibility for parties to re-align or disaggregate service areas after licensing to accommodate their particular plans may be beneficial (see Section 4.4). This may also be the case for rural and remote communities as, with the larger proposed service areas, licensees will likely focus on the more populous centres within the specific service area first. Alternatively, the Department could invoke some formal process and rules whereby smaller communities may be licensed separately from the proposed licensing process presented in this document?

Comments are sought on these proposals and related issues. If an alternative option is suggested, parties should include the precise method and definitions and how it would address the varying requirements of all potential licensees.

4.3 Eligibility

The Department proposes that applicants, and any affiliates thereof, should be limited to one spectrum block per service area in the licensing process.

It is Industry Canada's view that a broad range of service providers and potential services should be accommodated in the licensing process in order to provide opportunities for smaller and larger undertakings as well as to enhance the potential competitiveness in the marketplace. In this case, affiliate is defined in the same general manner as in subsection 35(3) of the *Telecommunications Act*, meaning a person who controls the entity, or who is controlled by the entity or by any person who controls the entity.

For any undertaking which will operate as a radiocommunication carrier as defined in section 10 of the *Radiocommunications Regulations*, applicants are reminded of the Canadian ownership and control provisions included therein.

4.4 Aggregation

It is recognized that licensees may wish to join forces with licensees of other spectrum blocks in the same and in other service areas or that parties may wish to

offer services in areas which do not conform to the predefined service areas in order to provide certain economies of scale or to more efficiently deliver their proposed services. This latter situation may be particularly true for rural and remote communities.

In order to accommodate these situations, the Department notes that parties could enter partnership or franchise-like arrangements either prior to or after licensing, or that licensees could apply to the Minister requesting a licence transfer, in whole or in part, subject to the proposed licence transfer guidelines outlined below, after licensing is completed.

Recognizing that parties may wish to offer services in more than one service area, the Department proposes that there be no geographic aggregation limits imposed on licensees. Under this proposal, licensees or their affiliates would be eligible to apply for several service areas, each area on a standalone basis, in the licensing rounds prescribed by the Department.

The Department's intent in dividing the available spectrum into smaller blocks is to provide the greatest opportunity for a diversity of providers and services in each marketplace. As well, the intent in offering larger service areas is to expedite licensing and respond to the known demand. However, it is clear from the expressed demand that there is no way to accommodate those who wish to obtain authority for the entire 2500 MHz MCS band while also accommodating those who require lesser amounts of spectrum. This is equally true where some parties wish to offer service nationally, while others would prefer to serve one community.

It is the Department's view that partnership and franchise-like arrangements amongst licensees and other interested parties either prior to or after licensing, or a permissive licence transfer approach after licensing may help to alleviate these situations. These may also facilitate the delivery of more services to more communities, and may permit the quick rationalization of service areas and spectrum blocks amongst interested parties. This could result in quicker implementation of service in smaller communities by shortening the licensing queue which could potentially result from having to evaluate competing applications in numerous small communities. The Department notes that partnerships or franchise-like arrangements with third parties may be a desirable alternative for all parties as opposed to licence transfer. Further, the licensing process is designed to specifically encourage such partnerships by the use of phase 1 of the comparative process. These partnerships are viewed as mutually advantageous by allowing parties to strengthen the base upon which they may make their application while also accommodating the potentially diverse plans of individual partners. See Section 5 for a more detailed description of the comparative licensing process.

In terms of licence transfer option, any licence transfer will require Ministerial approval. However, licence transfers would be considered according to the following proposed guidelines:

(i) Any requests for a licence transfer must be made jointly in writing by the original licensee(s) and/or the new entity(s) and must include provisions that the commitments made by the original licensee(s) will be completely adhered to or will be exceeded by the new licensee(s) commensurate with the scope of the right to be transferred.

(ii) For those who wish to transfer a geographic portion of a licence to another eligible party, such a transfer would only be permitted along census subdivision lines so that the spectrum licence fee could be recalculated commensurate with the percentage of households in each resulting licensed area.

(iii) In the frequency domain, a licence transfer would not normally be permitted where the fundamental spectrum blocks are disaggregated.

(iv) In either situation, such a transfer in whole or in part, would have to address the resultingly more complex technical coexistence issues especially concerning adjacent area/co-channel coordination, same-area/adjacent channel coordination and international coordination.

For licence transfers to take place, the original licensee will be required to return the licence to the Department once the transfer has been preliminarily approved so that the Department can revoke that licence and issue one or more new spectrum licences in its place.

The Department is soliciting comments on these proposals.

4.5 Incumbent Licensees

There are a limited number of licensed systems currently operating in this band. The following proposal was chosen in order to accommodate the needs of new MCS operators and to provide the opportunity for existing systems to continue to provide service.

(i) Any licensees of existing MCS systems (digital and analogue) may be grandfathered for continued operation in this band provided that prior to the commencement of a comparative licensing process encompassing that service area, they:

(a) are authorized to utilize digital technology, or if currently utilizing analogue equipment, convert their systems to digital in accordance with an authorization issued by the Department;

(b) align with the new band plan in accordance with an authorization issued by the Department; and

(c) reconfigure their system(s) to use the minimum number of channels necessary for current obligations to existing clients to the Department's satisfaction in areas where high demand for MCS spectrum blocks is expected, in accordance with an authorization issued by the Department.

These existing licensed systems will then be grandfathered on a station-by-station basis or will be given the option of amending their authorizations to spectrum licences, including all of the terms and conditions included therein. Failure to finalize plans and receive authority for such system modifications from the Department prior to the commencement of a comparative licensing process for that area will result in the systems being subject to the displacement proposal noted below.

(ii) Any licensees of existing analogue MCS systems wishing to apply in the proposed licensing processes MUST meet the requirements noted above in item (I) to be eligible to participate in a comparative licensing process encompassing the service area where the existing system(s) is (are) located. This provision of eligibility also applies to affiliates of licensees.

(iii) All MCS systems not meeting every provision of item (I) above will be subject to system displacement upon notification according to the following timeframes (see Section 5.1 for a description of the proposed licensing rounds):

- one year for round 1 service areas;
- two years for round 2 service areas;
- five years for round 3 service areas.

Such notification will be made by the Department upon receiving a justified request by the new licensee. As well, private arrangements between affected parties will be encouraged.

(iv) All existing subscriber radio and point to point systems will be grandfathered on a site-specific basis and are not eligible to convert their systems to the block area authorization approach utilizing the broad service areas proposed in this document. Potential spectrum licensees should consider the co-existence criteria discussed in section 4.7.3 in protecting these assignments. Respondents should also consider potential future treatment of such rural and remote systems as discussed in Section 4.2.

The above proposal attempts to balance the needs of the existing licensees with those of new MCS operators. This proposal permits the possible indefinite operation of some existing MCS stations, subject only to the conditions of their licence. These existing MCS systems could be potentially impacted only when a competitive licensing process for a given area is completed. Given the suggested timetable for licensing, certain areas

of the country will not be impacted for over seven years, if at all. In others, and particularly Toronto, a shorter timeframe is viewed as desirable given the demand for the spectrum and the need to be spectrally efficient.

In 1995, the Department conducted a public consultation in the province of Manitoba and thereafter implemented a proposal to use the MCS spectrum for province-wide Interactive Television (ITV) systems for schools. In some areas, much of the spectrum has already been assigned to the school systems. In the Department's view, ITV is a desirable use of spectrum promoting an information highway objective. Notwithstanding these facts, and considering the need to ensure an orderly development and evolution of wireless telecommunications facilities, these systems will also be subject to the policy provisions noted above. The Department notes that the potential timeframe for licensing in Manitoba will provide these licensees the time to consider system evolution to digital technology, which would permit the carriage of a broader range of traffic in a more efficient manner. The significant timeframe for displacement may result in private arrangements between affected parties to their mutual benefit.

In order for potential applicants to make decisions regarding their interest in this band, a list of all licensed stations (except developmental) can be found at http://strategis.ic.gc.ca/spectrum or by contacting the Department as outlined in Section 6. The Department has and will continue to issue developmental authorities on a site-by-site basis to interested parties upon request and approval by the Department. All such developmental authorities within a particular service area will expire, and operations will be required to cease, upon the announcement of the Minister's licensing decision for that service area.

In addition to the above, comment is solicited as to whether grandfathered MCS licensees authorized to offer service within the geographic area which is the subject of a competitive licensing process and who wish to apply for additional spectrum, should be expected to incorporate the existing spectrum requirements of their grandfathered system within the application for additional spectrum in this band.

4.6 Other Allocated Spectrum

Some MCS applications require separate 'go/return' channels to support two-way systems. Should spectrum outside the 2500-2596 MHz band be designated for return channels? Which frequency band(s) would be considered suitable for return channels?

Comments are requested on the channel (or block) size, number of return channels available to MCS operators, and the possible need for policy provisions to address the treatment of existing radio systems, and the need for technical limits to accommodate adjacent channel systems. (See Section 4.7 for additional considerations on the treatment of two-way MCS.)

4.7 Technical Considerations

The following section discusses technical aspects which should be kept in mind when responding to the proposals contained in this document, or in submitting new proposals for consideration. Comments are also solicited in some areas which will influence the technical requirements for this band.

4.7.1 Spectrum Blocks

The channel plan in the current SRSP alternates the channels between blocks to minimize adjacent channel interference. However, given the objective of this proposal to license more than one applicant within a given service area, assigning contiguous channels to form a block is deemed more appropriate to reduce the occurrence of adjacent channel interaction.

4.7.2 Bilateral Coordination

The operation of undertakings near the Canada/U.S.A. border is subject to the terms of the understanding with the Federal Communications Commission (FCC) in the United States. The understanding defining the specific technical sharing parameters for the band 2500 to 2686 MHz is currently under review between the FCC and Industry Canada to permit the inclusion of digital systems along with appropriate sharing criteria. Potential applicants should be aware of the requirement to notify or coordinate individual radio stations with the FCC within 80 km of the border before such systems can be put into operation. Specific procedures relating to coordination will be included in the policy and call for applications concerning this band.

The current understanding with the U.S. pertains to analogue systems and uses techniques of frequency offset and constraints on polarization to facilitate equitable access to the spectrum on both sides of the border. For digital systems, frequency offset will no longer provide any advantage and polarization discrimination remains as the major interference mitigating mechanism. The new agreement specifies minimum antenna characteristics (beamwidth, front-to-back ratio) and a power flux density (pfd) limit at the border which should allow for co-frequency use on both sides of the border.

The following are some of the proposed provisions related to international coordination:

(1) The use of cross-polarization is required for assignments within 80 km of the border. In general, the United States assignments shall use horizontal polarization of the electric field and Canadian assignments shall use vertical polarization of the electric field.

(2) A reference receive antenna pattern for coordination purposes shall be based on the following values:

Nominal gain: 22 dBi;
3 dB beamwidth: 12°;
Front-to-back ratio: 28 dB;
Boresight cross-polarization: 26 dB;
180° cross-polarization: 35 dB.

(3) For digital systems, a pfd of -80 dBW/m^2 will be established at the border as the coordination threshold.

(4) For analogue systems, a pfd of -70 dBW/m^2 at the border will remain as the coordination threshold.

(5) Computation of the pfd shall be based on free-space propagation loss calculation. If the above pfd threshold is not exceeded and the applicable technical parameters specified are observed, coordination of such assignments within 80 km of the border will not be required. However, notification of operating parameters of such assignments will have to be done in a timely manner. If the relevant pfd threshold is exceeded or the applicable technical parameters specified are not observed, the assignment shall be subject to coordination.

(6) For the Buffalo/St. Catharines-Niagara Falls, Bellingham/Vancouver areas, and the Detroit/Windsor Metropolitan areas technical considerations other than those noted above may be required.

(7) A list of existing stations may be compiled.

The existing and future U.S. systems may have an impact on the implementation of Canadian systems in certain areas. In all cases, the U.S. stations should be taken into account when planning the implementation of MCS systems in Canada near the border. Maps which illustrate the current information for U.S. stations within the border area in the proximity of the three service areas proposed to be considered first: Montreal, Toronto and Vancouver are available at http://strategis.ic.gc.ca/spectrum or by contacting the Department as outlined in Section 6.

4.7.3 Domestic Co-existence

Within the context of the coordination understanding with the U.S., Canadian systems will use vertical polarization within 80 km of the border. The use of any systems employing horizontal polarization within 80 km of the border will require coordination, and therefore the use of polarization discrimination as an interference mitigation technique in establishing co-channel, adjacent area

systems in Canada within 80 km of the border, will be limited. As a result, within this proposal, service areas have been designed to extend at least 80 km from the border, and the occurrence of adjacent boundaries within the 80 km has been minimized.

The proposals contained in this document will result in situations where licensees will hold spectrum licences for a service area with the knowledge that co-channel assignments will be made in directly adjacent service areas and adjacent channel assignments will be made within the same service areas. Licensing directly adjacent service areas with the intent to re-use all the spectrum in each service area, and allowing for contiguous coverage in each service area may be possible, through the use of area co-existence criteria and/or detailed coordination.

The size of service areas being considered will directly affect the burden of coordination and co-existence criteria, and the required triggers in both co-channel and adjacent channel situations.

4.7.3.1 Co-channel/Adjacent Area Co-existence Criteria

System implementation may proceed in a manner where ubiquitous subscribers are added on an on-going basis. This may require that co-existence be facilitated on an area basis. While the service areas, and more specifically service area boundaries, have been designed to minimize to the extent possible situations where interference would exist between systems in towns and cities in different service areas, these are not eliminated. *Comments are requested on the suitability of determining appropriate co-existence criteria for the entire licensed service area or coordinating on a hub station-by-hub station basis.*

The Department has noted the general support for spectrum (block area) licensing for MCS expressed in the comments to Gazette Notice DGTP-006-97 and has proposed this approach in the current consultation. The Department also notes the comments of several respondents to Gazette Notice DGRB-003-97 to the effect that the Department remain as a “court of last resort” in the case where licensees fail to successfully negotiate mutually acceptable co-existence. It is also noted that “successful” negotiations may be the result of having found mutually acceptable arrangements either in terms of electromagnetic compatibility (technical coordination) and/or any of a large number of commercial business arrangements. However, in being the “court of last resort”, the Department views as desirable the establishment of a regime which would enhance the probability of successful negotiation by pre-defining the “rights” of licensees.

Specifically, the Department seeks comment on the concept of establishing a criteria in terms of a pfd and/or unacceptable interference level at a victim receiver located within the boundary of a service area. This criteria would be the basis for determining with whom responsibility for resolution would lie in the event of irreconcilable differences requiring intervention by Industry Canada. Such a criteria should facilitate negotiations between the licensees and also would provide a criteria for the Department's role as a "court of last resort". The Department would expect that with the knowledge of what criteria would apply in the event of unsuccessful negotiations, licensees would be in a better position to negotiate superior mutually agreeable co-existence arrangements. *In the event that respondents find merit in this approach, the Department seeks comment on what criterion or criteria should be specified by which such determinations of unacceptable interference would be made.*

Alternatively, station-by-station coordination has served the industry well and has generally resulted in effective use of the radio spectrum. This process would require that all stations within some predefined border area would have to be coordinated with any existing stations to which or from which interference may result. *Should respondents find merit in this approach, the Department seeks comment on appropriate criteria (distance, antenna polarization discrimination etc) which should be utilized in performing coordination.*

4.7.3.2 Adjacent-channel/Same-area Co-existence Criteria

Adjacent channel operation, or any near-frequency signals, within the same general area will also have the potential for interference, particularly with respect to the near/far effect at the subscriber receiver when the transmitting hubs are not located in reasonably close proximity. An emission mask at the block edges will alleviate some of the potential for interference, but not all, especially where there is a mix of applications with different power requirements and intended serving areas within the licensed service area. Co-location will be encouraged to the extent possible but differences in power requirements or intended market may make this less feasible. Similarly as for the co-frequency, adjacent-area issues discussed in Section 4.7.3.1, adjacent-frequency, same-area operations can be addressed with co-existence criteria or with traditional coordination or both.

In terms of coordination, station-by-station coordination coupled with technical standards including emission masks and frequency plans has served industry and the Department well. It is noted that the size of the serving area will play a major role in the complexity of coordination within the service area since the larger the serving area, the greater the

potential requirement for multiple hubs to provide service. This will increase the difficulty of co-location when business cases between licensees are different, and therefore will increase the level of complexity of coordination.

Comments are requested on the suitability of determining appropriate co-existence criteria for the entire licensed service area or coordinating on a hub station-by-hub station basis. In either situation, suggestions are requested on appropriate criteria (pfd, emission mask, station location restrictions etc.) in order to best permit the fullest exploitation of this spectrum. For respondents recommending hub station coordination, comments are solicited on the appropriate mechanism and organization through which such coordination should take place. In addition to the preceding discussion concerning MCS to MCS system co-existence, comments are solicited on the appropriate mechanism to permit the co-existence of MCS in the frequency band 2500 to 2596 MHz and MDS licensees in the adjacent frequency band 2596 to 2686 MHz which may operate in frequencies near the common band edge (2596 MHz). It is noted that this situation may require a somewhat different approach as MDS licensees are issued site-specific authorities with associated service contours which may not be entirely compatible with the area co-existence concept.

4.7.3.3 Planned Systems

Issuing spectrum licences for a frequency range over a specified geographical area carries a measure of expectation of spectrum access within that service area to establish coverage immediately and in the future within the licensed service area. Co-existence criteria provide certainty for system implementation and impetus to affected parties to resolve situations to their mutual benefit. Coordination, on the other hand, adds a first-come, first-served aspect to spectrum licensing in which new entrants are expected to protect existing stations. This raises the question of protection of planned systems in the coordination process, in both co-channel/adjacent-area and adjacent-channel/same-area cases noted above.

Depending on the approach chosen (area co-existence vs hub coordination), there is a need to establish either appropriate co-existence criteria or coordination parameters. In the latter instance, this specifically requires that there be clearly stated obligations with respect to system coordination i.e. first-come first-served coordination of systems actually being implemented and/or the extent to which planned systems are considered. This is particularly true in point-to-

area implementations in which ubiquitous subscribers may be added on an on-going basis.

Additionally, should the Department decide to opt for individual hub coordination, licensing in sequential rounds rather than a single simultaneous round may mean differences in rollout near service area boundaries where coordination may be required. Incumbents licensed in later rounds will still be required to coordinate the systems of existing entrants licensed in earlier rounds. While the service areas have been designed to minimize coordination difficulties like this, licensees will also be expected to implement their systems to minimize the constraints to co-channel/adjacent-area and adjacent-channel/same-area future implementations to the extent possible. Such complications may suggest that area co-existence criteria be the preferred solution should planned systems need to be considered.

Comments are requested on the extent to which planned systems should be considered in arriving at approaches to permit both co-channel/adjacent-area and adjacent-channel/same-area operations (co-existence rights vs coordination).

4.7.3.4 Treatment of Two-way

There are 2 potential radio-frequency options for two way operations:

(1) in-band return; and
(2) out-of-band return.

Two way service will require some consideration for co-frequency/adjacent-area interference from subscriber terminals into adjacent hubs, however this is expected to be less significant than hub to subscriber interference.

(1) In-band return will increase the level of adjacent-channel/same-area coordination required as:

- subscriber terminals will be transmitting in adjacent spectrum to other subscriber receivers;
- hubs will be receiving in spectrum in which adjacent hubs are transmitting; and
- hubs will be receiving in spectrum in which adjacent subscribers are transmitting.

(2) In an out-of-band return scenario, the same adjacent channel/same-area considerations will exist as with the in-band option within that other band as hubs will be receiving in spectrum in which adjacent

subscribers are transmitting. Hubs receiving in adjacent spectrum could also suffer the same near/far problems as subscriber terminals especially when the hubs are not co-located.

4.7.3.5 Other Technical Considerations

Additional technical issues for consideration include the following. It is noted that the use of spectrum licences along with appropriate co-existence criteria or coordination mechanism may render some of these requirements moot. *Comment is requested regarding these specific technical guidelines and whether they continue to be required, notwithstanding international coordination requirements.*

Power

The maximum effective isotropic radiated power (EIRP) in any direction and for either vertical or horizontal polarization shall not exceed 32 dBW for each 6 MHz channel.

Effective Height Above Average Terrain (EHAAT)

The effective height above average terrain (EHAAT) is the height of the antenna's radiation centre above the average terrain as averaged for eight radials. The average terrain is the average level of the ground elevation between 3 and 16 km from the transmitter as averaged for eight evenly spaced radials starting from true north. Traditionally, the EHAAT should not normally exceed 200 metres. Heights above 200 metres will be considered as special cases. For such cases the maximum permissible EIRP (32 dBW) shall be reduced by 1 dB for every 25 metres of increase in height above 200 metres to a maximum reduction of 5 dB at 325 metres. EHAAT’s in excess of 325 metres normally are not permitted.

Antenna Characteristics

Antenna characteristics should be similar to those proposed in the Canada/U.S. understanding concerning coordination.

Down-converter noise figure

3 dB for analog
1.5 dB for digital

Service Contour

In the case of a digital system, the calculation of the service contour is to be based on PREDICT 2.08[1]. The program takes into account the system parameters and the actual topography. Predicted values should be based on 90% of the time and locations. Other approved methods may also be used to predict the location of the service contour.

5. Licensing Proposals

Due to interest already expressed, it is anticipated that the demand for this band in certain service areas will result in mutual exclusivity in application. Consequently, the Department will be using a comparative selection and licensing process to introduce MCS at 2500 MHz in Canada. *Comment on the proposed approach, licence fee and conditions and any other related issues are sought.*

The comparative selection and authorization process is conducted in phases. Phase I announces the process and requests Expressions of Interest from applicants. A list of all those who expressed interest and the service areas is made available to the public as soon as possible after the filing date. This provides applicants with an opportunity to be aware of other interested parties and to identify those with whom they may wish to form alliances for the purposes of making Detailed Submissions in Phase II.

In Phase II, Detailed Submissions are filed by applicants. During this phase, Industry Canada evaluates the submissions and reserves the right to request additional information for the clarification or resolution of issues arising from this evaluation. Any such requests are made in writing to the applicants with responses to be in writing. Direct contact with Departmental officials concerning the merits of any submission is not entertained during this phase of the process. This does not limit contact with departmental officials concerning the process in general or for other unrelated issues.

In Phase III, successful applicants are authorized to deploy their systems. For 2500 MHz MCS, site-specific radio station licences will not be required for each radio installation of the proposed system as we propose to issue spectrum (block area) licences . However, successful applicants must obtain all other appropriate approvals associated with sites including, as applicable, international coordination and technical sharing, antenna structure clearance, and environmental, radio frequency fields and land-use consultation. Further, licensees will be required to retain information on each hub site for ready access by the Department should the need arise. In order to facilitate international coordination, licensees may also be required to submit certain technical information to the Department as stations are implemented. Details on the exact data requirements, including the format, will be made available in the final policy and call for applications.

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[1] PREDICT 2.08 may be obtained by contacting the Technology Transfer Office of the Communications Research Centre at (613) 998-2325 or (613) 998-2321.

5.1 Licensing Process

The Department proposes to commence comparative licensing processes according to the following rounds and tentative timetables:

Round 1 - Three Service Areas

Call for applications in April, 1998

Greater Toronto, Greater Montreal, Vancouver (Lower Mainland and Vancouver Island)

Round 2 - Seven Service Areas

Call for applications in December, 1998, subject to completion of round 1

Alberta, Southern Ontario, Eastern Ontario & Outaouais, Central Quebec, Eastern Quebec, New Brunswick, Nova Scotia & P.E.I.

Round 3 - Seven Service Areas

Call for applications in August, 1999, subject to completion of round 2

British Columbia, Yukon and N.W.T., Saskatchewan, Manitoba, Northern Ontario, Northern Quebec, Newfoundland

Each of the three licensing processes will follow the normal comparative process guidelines. Further, it is proposed to concurrently run Phase I and Phase II in order to more expeditiously complete the licensing actions. Based on the input received in Phase 1 of any round, should there be sufficient spectrum to accommodate the demand, the Department will proceed to immediately license the requests on a first-come, first-served basis.

Following the announcement of the Minister's decision for round 1, the Department will proceed to issue the call for applications for round 2, and then for round 3.

Given the complexities and varying demands of prospective licensees, it is proposed to conduct a comparative licensing process for all contested areas in a number of rounds. This will permit the timely licensing of the most highly sought after service areas within the constraints associated with attempting to simultaneously evaluate a large number of detailed applications in a comparative process.

5.2 Licence Fees

Industry Canada proposes an annual authorization fee of $0.008 per household per 6 MHz of spectrum in each service area. This fee has been directly derived from the fee currently paid by LMCS licensees authorized at 28 GHz. A table showing the respective fees per 6 MHz for the proposed service areas is included in Appendix A. These licence fees are pro-rated for the fiscal year (April 1 to March 31) based on the proportion of the fiscal year which remains at the time of initial licence issuance. Following the receipt and analysis of comments, the Minister will set the spectrum licence fee for MCS at 2500 MHz in accordance with the provisions of the *Department of Industry Act.*

Established government policy is that fees should reflect the economic value of the radio frequency spectrum resource associated with the licence. However, in the absence of a market-based mechanism by which the economic value would be revealed, the Department recognizes that such determinations are difficult. Nonetheless, the Department proposes to adjust the annual licence fee when new market information, including census data, becomes available. The Department notes that new spectrum-based technologies have significant potential to compete with non-spectrum based (e.g. copper twisted-pair, coaxial and fibre optic cable) technologies in the provision of telecommunications and broadcasting services. Further, the Department is concerned that the choice of technologies not be distorted by the availability of spectrum at a cost that is not representative of the opportunity cost associated with its use.

In addition to the above, it is proposed that at the time of application that all applicants must submit, with their Phase II Detailed Submission, a non-revocable financial instrument such as a letter of credit for 20% of the total value of the authorization fee that corresponds to the frequency blocks in each service area for which application is being made. The financial instrument would only be drawn upon if default of the initial authorization fee occurred and only in the amount that corresponded to 20% of the authorization fee for the blocks authorized in each service area. The financial instrument would be returned to those who are unsuccessful in licensing. The balance of the authorization fee for the blocks authorized in each service area would be due within 30 days of the Minister's announcement and issuance of an authorization. Thereafter, the annual fees would be due on April 1st of each year.

As well, the Department is considering an adjunct measure to ensure that parties have documentary evidence demonstrating that, should the application be successful, that all of the proposed funding within the business plan be unequivocally available on or before the date of the announcement of the Minister’s decision. Should the Department utilize such a benchmark for submission review, wherein a submission not meeting the required benchmark would not pass a basic eligibility requirement? If yes, at what level should the unequivocal system funding requirement be set? Requiring a 100% commitment may ensure guarantees of service, but may be viewed as unfair to those who would require a licence in order to firm up financing. *Comments on these proposals are sought.*

5.3 Licence Conditions

Elements of government policy directly applicable to MCS at 2500 MHz will be made conditions of authorization. These conditions may include that holders of MCS authorizations:

(i) must substantially adhere to the system rollout plans and commitments made in their submissions;

(ii) must spend 2% of adjusted gross revenue on R&D[2];

(iii) must file a detailed annual report outlining progress made in all areas for the first five years, augmented with semi-annual interim reports indicating system implementation progress for the first two years;

(iv) must comply with the Canadian ownership and control eligibility criteria as set out in section 10 of the *Radiocommunication Regulations*, as applicable.

You must notify the Minister of any change which would have a material effect on your ownership or control in fact. Such notification must be made in advance for any of the proposed transactions within your knowledge.

(v) must ensure that radio installations are installed and operate in a manner that complies with Health Canada's limits of exposure to radio fields;

(vi) must mark antenna structures, where applicable, in accordance with the recommendations of Transport Canada;

(vii) must consult with the appropriate land use authority prior to the installation of significant antenna structures;

(viii) must comply with technical sharing and international coordination standards and agreements;

(ix) must make available the facilities and capacity for lease, resale and sharing;

(x) must, from the inception of service, provide for and maintain lawful interception capabilities as authorized by law;

(xi) must make available to the Department upon request required technical details of hub stations in the format prescribed by the Department;

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[2] Eligible R&D is that which would meet the definition used by Revenue Canada.

(xii) must obtain Ministerial approval for any proposed licence transfer;

(xiii) must pay the annual licence fee.

These conditions are similar to those placed on other authorizations issued through comparative licensing processes and for a certain number of them, on spectrum licences in general.

6. Additional Information

Interested parties should direct requests for additional information to the Department at (613) 998-3768, at the filing address indicated in Section 7, at the offices of the Department in Moncton, Montreal, Toronto, Winnipeg or Vancouver, or electronically via the Internet at 2500MHz@ic.gc.ca

7. Filing Address

Interested parties should submit comments in writing and/or electronic format (comments submitted in electronic format should be in either WordPerfect or Microsoft Word - please specify the software, the version number, and the operating system used in a covering note) to:

Consultation on 2500 MHz MCS
Radiocommunications and Broadcasting Regulatory Branch
Industry Canada
300 Slater Street
Room 1514A - Jean Edmonds Tower North
Ottawa, Ontario
K1A 0C8

Comments in electronic format may also be submitted via the Internet at 2500MHz@ic.gc.ca

All representations must be received on or before February 16, 1998 to receive full consideration and should cite the *Canada Gazette* Part I Notice publication date, title, and the Notice reference number.

Written comments received in response to this Notice will be made available for viewing by the public, two weeks after the closing date of this Notice, during normal business hours, at the Industry Canada Library, 235 Queen Street, Ottawa, and at the offices of Industry Canada in Moncton, Montreal, Toronto, Winnipeg and Vancouver, for a period of one year from the close of the comment period.

Appendix A

MCS in the band 2500 to 2596 MHz
Licence Fees for Each Service Area

Licence Areas	Fee/1 X 6MHz	Fee/ 2 X 6MHz	Fee/4 X 6MHz
Lower Mainland & Vancouver Island	$7 460.34	$14 920.68	$29 841.36
British Columbia	$2 469.76	$4 939.52	$9 879.04
Alberta	$7 290.80	$14 581.60	$29 163.20
Saskatchewan	$2 888.44	$5 776.88	$11 553.76
Manitoba	$3 211.68	$6 423.36	$12 846.72
Northern Ontario	$2 265.96	$4 531.92	$9 063.84
Eastern Ontario & Outaouais	$5 619.16	$11 238.32	$22 476.64
Southern Ontario	$5 603.08	$11 206.16	$22 412.32
Toronto	$16 287.72	$32 575.44	$65 150.88
Montreal	$10 750.76	$21 501.52	$43 003.04
Northern Quebec	$534.24	$1 068.48	$2 136.96
Central Quebec	$4 340.40	$8 680.80	$17 361.60
Eastern Quebec	$4 729.68	$9 459.36	$18 918.72
New Brunswick	$2 027.28	$4 054.56	$8 109.12
Nova Scotia & P.E.I.	$2 951.76	$5 903.52	$11 807.04
Newfoundland	$1 390.28	$2 780.56	$5 561.12
Yukon & N.W.T.	$205.96	$ 411.92	$823.84