Globalstar Canada Co.
75 Watline Ave., Suite 140
Mississauga, Ontario L4Z 3E5
Phone: 905-712-7182 Fax: 905-890-2175

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Mr. Larry Shaw
Director General, Telecommunications Policy Branch
Industry Canada
300 Slater Street
Ottawa Ontario K1A 0C8

Globalstar Canada Response to
Canada Gazette Notice, DGTP-001-05, dated May 2, 2005
Consultation Paper on a Renewed Spectrum Policy Framework for Canada and Continued Advancements in Spectrum Management

Dear Mr. Shaw,

We have reviewed with considerable interest the document "Consultation Paper on a Renewed Spectrum Policy Framework for Canada and Continued Advancements in Spectrum Management ", also known as Document DGTP-001-05 (the Document), that was issued recently on May 2, 2005

In general, we are fully in support of the Department's timely initiatives to modify the existing spectrum policy framework. We compliment you on bringing this matter to our attention in such a clear fashion, and are happy to be able to give our views on this document to Industry Canada (the Department). We have participated in the work of the RABC in responding to this Gazette Notice, and agree with many of the comments of the Board. This letter is to bring to your attention our thoughts on three topics raised in the Notice:

* The need to provide advanced telecommunications services to rural and remote communities and regions;
* The potential use of the concept "interference temperature" for management of the sharing of spectrum between telecommunications networks, and between networks and devices; and
* The means for bringing licensed-exempt telecommunications services in Canada.

These topics are considered in more detail in the attached Annex. A.

I am sure that you and your staff will consider our thoughts in that annex fully in developing the spectrum policy framework and spectrum management processes for Canada in the coming years.

Sincerely

Brian Martin
General Manager
Globalstar Canada Co.

Annex A

Detailed Response of Globalstar Canada To Gazette Notice SMSE-002-05

1. Introduction

Globalstar Canada compliments Industry Canada for gazetting the "Consultation Paper on a Renewed Spectrum Policy Framework for Canada and Continued Advancements in Spectrum Management", referred later in this document as "the Consultation". Globalstar Canada operates a mobile-satellite system in Canada as part of the world-wide Globalstar system. Many of the users of the telecommunications services that Globalstar Canada provides are in the rural and remote areas of Canada that are referred to in the Consultation. Our comments on the Consultation reflect our experiences in providing these services to Canadian users of our network, and our experiences in ensuring that there are sufficient spectrum resources available to provide those services.

As indicated in our covering letter, Globalstar Canada has participated in the work of the RABC in responding to the Consultation, and agrees with many of the comments in the RABC's response. In this annex we respond to three areas raised by the Consultation:

- The need and the means to provide advanced telecommunications services to rural and remote communities and regions;
- The potential use of the concept "interference temperature" for management of the sharing of spectrum between telecommunications networks, and between networks and devices; and
  .
- The means for implementing licensed-exempt devices using radio spectrum in Canada.

These topics are discussed below in Sections 2, 3, and 4 respectively.

2. The Provision of Telecommunication Services to Rural and Remote Areas:

This topic is addressed in Sections 6.1.2, 6.2.3, and 11.8 of the Consultation.

Consideration in Section 6.1.2 of the Consultation: Eight Core Objectives are listed in Section 6.1.2 of the Consultation. The 6th listed core objective is

To facilitate the use of spectrum in rural and remote communities and regions.

Perhaps what the Department meant was

> *To facilitate the availability of spectrum to enable the provision of advanced telecommunications services in rural and remote communities and regions.*

The RABC considered this core objective in some detail, and suggested the following slightly different wording:

> *To facilitate, through flexible frequency management tools and regulations, the use of spectrum to implement advanced communications services for the benefit of all Canadians in all communities and regions of Canada**, including the most remote areas and off-shore installations;***

Each of these three texts states that a core objective of the Department should be to ensure that spectrum is available for the provision of telecommunications services in (rural and) remote areas (parenthesis added because the RABC text does not explicitly mention rural areas as such). Whatever final text is chosen by the Department, it would seem obvious that all agree that means should be made available for the provision of advanced telecommunication services in rural and remote areas, and that the telecommunications infrastructure necessary to provide these services in rural and remote areas may be different from that which is used to provide the same services in urban and suburban regions.

Consideration in Section 6.2.3 of the Consultation: This section of the Consultation, and specifically New Policy Guideline 9, addresses the need to *"facilitate access and use of the radiofrequency spectrum…to meet societal needs… such as communications services in rural and remote areas "*.

This Guideline fully recognizes that the mechanisms necessary for the provision of societal needs in rural and remote areas are in some cases different in rural and remote areas than they are in urban and suburban areas. For instance, the Globalstar Canada mobile-satellite network currently provides the following emergency telecommunication services in rural and remote areas:

- For forest-fire fighting, including communication to and from water bombers;
- Telecommunications to and from air ambulances; and
- Telecommunications by police in remote areas.

These services have the same importance in rural and remote areas as the provision of dedicated or priority spectrum for terrestrial mobile communications for emergency services, i.e. police, fire, and ambulance services in our urban and suburban areas, with the same emphasis on speed of response to the emergency. It is just that the telecommunications mechanisms are different in our rural and remote areas, requiring different portions of the radiofrequency spectrum for their provision.

Consideration in Section 11.8 of the Consultation: Section 11.8 addresses the fostering of advanced communication services in rural Canada. It is assumed here that the Department is interested also in fostering these same advanced services in remote Canada. (Proposed Core Objective 5 in Section 6.1.2 of the Consultation proposes the

facilitation of such services to benefit all Canadians, including those in rural and remote areas of Canada.) This issue is focused in the Consultation through the posing of Questions (19), (20a), and (20b).

Question 19: This question asks explicitly what is the definition of rural areas and what is the definition of remote areas in Canada. The answer expected may be a demographic one, in terms of the population density per km^2 in different areas. However, that may not be a productive route to follow. Another possible route might be to recognize that the provision of telecommunication services, both basic and advanced such as access to the Internet, are provided in remote areas by satellite. These include services through fixed-satellite networks such as the ANIK networks, broadcasting-satellite and DTH fixed-satellite services for the provision of video and audio programming, and mobile-satellite services through networks such as the Globalstar Canada network. In remote areas there is no terrestrial means of providing telecommunications services, unless one considers troposcatter or HF radio. Perhaps that is the best definition of Remote Canada from a telecommunications perspective: those parts of Canada where the normal or perhaps only means of providing advanced telecommunications is through a satellite network.

An urban area of Canada is very different; it is an area where telephone, television, and internet availability is primarily by wire, including coaxial cable and optic fiber. Emergency communications is provided through dedicated or priority terrestrial mobile channels, and cellular mobile, including IMT2000+, is provided through terrestrial mobile channels. There is of course off-air television delivery as an alternative to delivery through wired infrastructure. From a spectrum policy perspective, the task is to provide enough spectrum in an urban area to meet the needs of the radio portion of that telecommunication-delivery infrastructure in an environment where there is a high population density and a demand for services that require wider channel bandwidths, such as video IMT2000+ in a high-population-density environment.

Rural Canada varies from a telecommunications-delivery perspective from close to urban in some cases to close to remote in others. In the corn and dairy farm areas of Eastern Ontario, the fruit and grape farms of the Niagara area, and the wheat farms of the prairies, telecommunication delivery is similar in many respects to that provided to urban areas. However, the provision of telecommunication services in the mining and forest-product areas of northern Ontario and Quebec, and in some oil-exploration areas of northern Alberta, the provision of telecommunication services is more similar to its provision in remote areas. Whether these areas are classified as “thin rural” or “remote” is academic; the bottom line is that satellites play a major role in the delivery of their telecommunication services.

In summary, we have not tried to put demographic numbers in terms of xyz persons per km^2 on what is urban, what is rural, and what is remote. Rather, what we have tried to show is that in different areas of Canada, with its millions of km^2 and a very low population density over much of that area, there are established indispensable need for the delivery of telecommunications services by different physical means: by wire, by terrestrial radio, or by satellite, including mobile-satellite by networks such as that

provided by Globalstar Canada. To remove or reduce the capabilities of any of these telecommunications-delivery components through changes in Canadian spectrum policy would seriously diminish the provision of services to Canadians in one area of Canada or another.

Question 20a: Should Spectrum Policies Vary by Geographic Area: It is evident from discussions above, in considering **Question 19**, that the telecommunications services required in urban, remote, and rural parts of Canada are similar, but that the telecommunications infrastructure that can be used to deliver these services economically are very different in different demographic parts the country. This telecommunications structure varies from primarily wire and terrestrial radio in urban regions to primarily satellite based in remote areas. Different rural areas are served through different types of telecommunications infrastructure: rural areas such as the fruit and wine Niagara region use infrastructure similar in many ways to that in urban areas, whereas the more thinly populated lumber, pulp, mining, and oil producing and exploration areas have infrastructure requirements more similar to remote areas. In other words, the market place decides whether and how telecommunications services are provided in rural areas; the infrastructure installed to do so may be similar to that of urban areas in some cases, and similar to remote areas in other cases, or may be a mixture of the two.

Spectrum policies and regulations must reflect that fact, especially in today's environment where there is simply no "unused" radio spectrum, especially below 10 GHz. Spectrum policy must foster both the requirements of the urban and higher-density rural areas, and also foster the requirements of remote and lower-density rural areas. This may in some instances require the allocation of the same radio spectrum to allow implementation of infrastructure to serve urban and higher-density rural areas and also allow implementation of infrastructure to serve remote and lower-population-density rural areas. There may be engineering difficulties in some cases in allowing these different infrastructures to operate in the same frequency band without causing harmful levels of interference between them, but engineering solutions are available and should become part of the associated radio regulations, reflected in appropriate SRSP's and RSS's.

Question 20b: Technical/Operational Parameters for Spectrum Management Policies: We will not address different technical parameters of systems of a given radiocommunication service here, although that is an important subject. Another topic that requires attention is that, if one telecommunications infrastructure is required to meet the needs of urban citizens, and a different infrastructure to meet the needs of citizens in remote areas, and the two cannot share spectrum in the same small area, how should the division between the two be regulated in rural areas, the areas that possibly could be served by either means. The regulator (Industry Canada) has to ensure in whatever it does that both types of system are economically viable, because one is vitally necessary in the urban environment and the other in the remote environment.

Perhaps a solution might be to grant licenses in rural areas to one type of infrastructure from one edge of a given band, and to the other type of infrastructure from the other edge

of the same band. In that instance the market place would determine the division of the band in that area.

3. The Possible Introduction of the Interference-Temperature Concept in Canada

The concept of "interference temperature" is introduced in the Consultation in **Section 6.2.4.1,** and also in **Section 11.7**. This section of our comments addresses the mention of "interference temperature" in those sections of the Consultation.

In the Consultation it is noted that the concept has been introduced in the USA by the FCC. However, there are as yet unresolved problems associated with its use as the primary performance criteria or statements of maximum permissible interference between telecommunication networks, or between a network and unlicensed devices.

There is a long history of frequency sharing between two networks based on agreed single-entry interference levels from the transmitter of one network and the receiver of another, negotiated between the operators of the two networks if necessary. In other words, sharing to date is based on single-entry agreements between operators, with the primary focus of the agreements based on single-entry magnitude of the interference caused by the transmitting stations of the two operators.

The "interference temperature" concept, instead, is based on a priori limits to the aggregate interference into receiving stations. It puts the entire onus on the operator of the receiving station to protect himself in an environment where there are not explicit limits on the number or the locations of transmitting stations or devices.

There are suggestions that the "interference temperature" should be continuously monitored, either by transmitting stations or devices, or by receiving stations, or by some third party possibly doing the measurements on behalf of the regulator. Presumably if the measurement indicates at that particular time that the specified "interference temperature" is exceeded the transmitter would cease operation until the "interference temperature" measurement indicated enough reduction that it could resume operation. This seems to be a very complex cumbersome approach to frequency management, and has not shown itself to be workable in the field.

Another serious problem with the interference temperature concept is that seems to be built on the premise that satellite networks such as the Globalstar network have excess interference margin just waiting to be used for additional networks regulated through some form of "interference temperature" limitation. The reality is that the Globalstar network, like most other satellite networks, is power limited in the sense that the amount of traffic through them is limited by the transmitter power of its spacecraft transponders. Margins are necessary to accommodate losses from a number of things that might happen at any time to reduce the performance of any one of a large number of satellite-to-user-terminal links. The implementation of a margin is very expensive, and its inclusion

reduces the profit margin of the network; it would not be included in the satellite system design unless it was deemed to be essential for the operation of the network. For those reasons it should not be simply eliminated or significantly reduced by the regulator to allow the operation of additional services in the band.

A third problem is that the "interference temperature" is a stochastic or random quantity that is very difficult to measure on an ongoing basis in the field with any accuracy. As an example, Globalstar Canada and Globalstar are expending considerable resources to be able to measure the "interference temperature" from transmitting RLAN devices in the 5150-5250 MHz band. It has been stated in ITU-R WP-4A fora that such measurement cannot be done. And this is one of the few situations where measurement of average "interference temperature" averaged over long periods of time, (not the measurement of necessarily short-term peak "interference temperature",) may be possible. Minute-by-minute dynamic measurement of "interference temperature" would be much more difficult, even in the 5150-5250 MHz band.

For these many reasons, Globalstar Canada cautions the Department from introducing the concept of "interference temperature" without first undertaking a thorough study of the many problems associated with the process, including those outlined here. At the very least, the Department should ask for comments on the process through a gazetted discussion paper on the subject, a request that has also been made by the RABC.

4. The Implementation of License-exempt Devices using Radio Spectrum in Canada.

In this section of our response we address the comments and questions on license-exempt spectrum raised in **Section 11.2 of the Consultation**. The two types of license-exempt that Globalstar Canada has considered in depth are 5 GHz RLAN devices and UWB devices in several bands. Our comments will be based on those experiences.

It has been observed that early development of a type of license-exempt device is first centered on the technical parameters of the device that will make it viable. A necessary subsequent stage in the process is discussion of how such devices can share the radio spectrum with networks and/or other devices that already use the band, because there are no unused bands, as least below 30 GHz. An integral part of this subsequent set of discussions seems to be a "demand study" of how many license-exempt devices of different types, with different technical parameter values, will be present when the market for the device in question is mature. This total number, or number per km^2, is an important ingredient in the negotiated agreement on such parameter values of the device as power levels, power density values, and antenna characteristics. For instance, the total number of RLAN devices in the 5150-5250 MHz band in North America was a major consideration in agreeing to the device power level per MHz and the constraint that the device operate only indoors.

This regulatory agreement on device technical parameters is followed by the implementation of the service, the offering of the license-exempt device in the market place. Early estimates of 5 GHz RLAN devices were revised upwards recently when computer manufacturers began putting an IEEE 803.11 5 GHz RLAN device in most computers being sold. A related potential problem in this case is that the final user of the device is not told that it must be used indoors only.

This same or a similar route may be traveled in the development and sales of UWB devices. With UWB devices the "spectrum-sharing compatibilities" studies are focused on the maximum power or power density of the UWB device, combined with statements of the minimum distance between a transmitting UWB device and the receiver of a network, terrestrial or satellite. A weak aspect of such studies is that there are no measures specified to be taken to ensure that no UWB devices is closer to the receiver of the licensed network than the minimum distance specified in the studies that resulted in the maximum power density limitations of the device.

Question (5) asks what measures should the Department take when such devices are allowed into the market-place. A few things that the Department can do might be to:

1. Estimate the number of license-exempt devices in a given band in the "supply side" rather than the "demand side" of frequency-band use. In other words, ask how many license-exempt devices could be implemented before they saturate use of the spectrum through interference between themselves. This would seem to be more realistic, because applications to which the device may be put is very likely to change over time, with the corresponding change in the number and geographic density of devices in service, as the market for the device evolves. This evolution may be limited only by saturation of the available spectrum over the band available. It is that number or density of devices that potentially might interfere with licensed networks.

2. Do rigourous type-approval testing of the device so that devices on the market meet their regulatory constraints. This may be the most effective regulatory control of the band, once the device is approved for use by the general public on a license-exempt basis.

3. Educate the public on operational constraints on how the device can be used. This may be difficult, but such operational constraints as "indoors only" or "not within a certain distance from a licensed station" are words only unless members of the general public follow the rules.

4. Monitor, perhaps by observing how many devices are manufactured, whether or not the number of devices in the field exceeds by large margins the numbers expected in the compatibility studies that were used in determining the required technical constraints on the devices. If it is obvious that the numbers exceed by large margins the numbers used in the compatibility estimates, and because of that the interference is exceeding the agreed-to

limits in the compatibility studies, then the Department should take the necessary measures to constrain further sale of the devices until such further sales is balanced by the discarding of previously sold devices.

If such steps are not taken, the “interference temperature” (see Section 3 above) of licensed receivers may increase without effective control, which would reduce considerably the operation of licensed networks in the band, and so the value and benefits of a radio license in the band. From a larger perspective, the increased interference that the licensed network would be subject to would degrade the capacity of that part of the national telecommunications infrastructure that the affected network contributes.