

NEPTUNE TECHNOLOGIES GROUP
(CANADA) LTD.

RESPONSE TO DGRB- 008-09

**CONSULTATION ON A NEW SPECTRUM
LICENSING APPROACH AND FEE FOR
NARROWBAND MULTIPOINT COMMUNICATION
SYSTEMS (N-MCS)**

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EXECUTIVE SUMMARY

1. Neptune Technologies Group (Canada) Ltd has 100 years of experience in Canada in the waters utilities market.
2. Neptune supports Industry Canada's desire to take a more rational and practical approach to the licensing and fee structure for Narrowband Multipoint Communications systems.
3. Neptune encourages the department to proceed and expeditiously bring to conclusion this necessary consultation, but not lose sight of the "fees to encourage spectrum efficiency" theme as it continues to review its fees.
4. Neptune supports the concept of the need to support a wide "range of services" in bands across the radio frequency spectrum and in particular to ensure that applications that use the spectrum more efficiently are always afforded the right to access to spectrum.
5. It is clear that in its formulation, the focus of this document was on being minimally intrusive, effective and efficient. Neptune requests that the department not diverge from this approach as it interprets the inputs to this consultation.
6. The current fee structures for Narrowband MCS is outdated, cumbersome and discriminatory to this application compared to traditional mobile services below 1 GHz. There is also a significant administrative and financial burden associated with these types of services which are clearly driven by the marketplace and the need to reduce costs of managing key societal infrastructures.
7. The approach Industry Canada is proposing with this consultation on the new licensing approach for N-MCS will over time, improve cost-effectiveness and timeliness of the regulatory process as well as strengthening performance and accountability measurement.
8. **Neptune recommends that despite the many differences with MCS systems, the fee for N-MCS should not be greater than the most closely related service, MCS. i.e. \$.00052/MHz/pop.**
9. **There should be no Minimum Fee (the consultation proposes \$1000) for N-MCS systems as this would discriminate against smaller systems and those in remote (lightly congested) areas.**

10. **Neptune recommends that the spectrum licence fee should be discounted by the factor of Pop/Household, resulting in a proposed fee of .0002/MHz/pop.**
11. **Neptune recommends that the fee should be prorated over a 3 year period to take into account the time needed to implement typical N-MCS systems.**
12. **Neptune submits that for new N-MCS proposals, the fee should be implemented as soon as the fee process under the User Fee Act has been completed.** Should there be cases where there are significant licence fee increases due to the implementation of these proposed fees, existing licensees should be given the option of paying the existing fees for a three year period before receiving new spectrum licences and being charged the new fee.
13. **For systems which are proposed and implemented prior to this new fee structure being implemented, Neptune encourages the department to move expeditiously to issue spectrum licences for new N-MCS systems to allow infrastructure data collection and monitoring productivity to be taken advantage of. Fees would be charged when the new fee structure is approved.**

Neptune Technologies Group (Canada) Ltd. response to Industry Canada's Gazette Notice DGRB -008-09: Consultation on a New Spectrum Licensing Approach and Fee for Narrowband Multipoint Communication Systems (N-MCS).

NEPTUNE TECHNOLOGIES GROUP (CANADA) LTD – WHO WE ARE, TECHNOLOGIES USED AND AMR INDUSTRY STRUCTURE

a) Who we are

Neptune has been addressing the Canadian market for over 100 years with prolonged success in the water utilities market. It is an integrated supplier of meters, automatic meter reading (AMR) equipment, reading systems, installation services, operation and maintenance, meter reading, billing services, and Customer service.

Neptune is headquartered in Mississauga Ontario, where it has office, warehousing and testing facilities. It employs approximately 80 people in accounting, HR, Customer service, project administration, technical support, field services and dispatch and customer call centre.

Neptune is part of a larger organization, Neptune Technologies Group Inc, with offices in Tallassee AL, Plano TX, Juarez MX and Mexico City.

Neptune is an industry leader in the water meter market boasting the largest share of the Canadian market. It produces the meters, encoding devices, RF systems, handhelds, mobile data collectors and meter reading software. Neptune has deployed, on average, roughly 25 new meter reading systems a year (mainly mobile in the 902 to 928 MHz band). This is noteworthy because we see technology shifting from unlicensed mobile systems to licensed fixed network systems. We do not expect the total number of new systems to decrease in the next few years, implying demand for licensed fixed network systems will grow and likely half the number of systems we implement in a few years will be licensed network systems.

Current customers include:

Region of Peel, ON

- 250,000 meters

Region of Durham, ON

- 175,000 meters

Town of Richmond Hill, ON

- 45,000 meters

Township of Centre Wellington, ON

- 4,500 meters

City of Clarence-Rockland, ON

- 4,000 meters

Town of Renfrew, ON

- 3,000 meters

Most of the Neptune's customer base is made up of municipal customers with a handful of privately operated Utilities (E.g.: Halifax Regional Water Commission, Aquatera, etc).

b) A Complete Overview of Neptune Technology can be found in Appendix A

c) North American Industry Overview¹

Utilities

The main trend in the industry, which is a fact, is that up to 2008, ninety percent (90%) of the systems sold were mobile and licensed and the remaining ten percent (10%) were licensed. We see this trend changing in the future, where roughly fifty percent (50%) of the systems Neptune is proposing (new sales) are asking for fixed network licensed systems. Though Canada is currently lagging the U.S. by a small margin in this regard, it will close the gap over the next few years, in our view. Despite utility deregulation (largely in the electric and gas utilities, not the water utilities), the overwhelming majority of AMR users are regulated

¹ Excerpts from "The Scott Report: Worldwide Deployment of Automated Metering Devices", Twelfth Edition, Howard A.Scott, PH.D.

utilities. In most instances, AMR units are acquired by individual gas, electric or water utilities, not combined utilities or multiple utilities.

The instances where one project serves more than one utility are rare. However, there are a growing number of projects in which a multi-utility company (e.g., one that offers gas and electric services to customers) reads more than one type of meter over the same communications infrastructure (the two largest AMR projects have deployed both electric and gas).

Premises LANs

An increasing trend has been the introduction of AMR systems that connect to a Local Area Network (LAN) within the customer's premises. The LAN is used to provide remote access to other on-premises services through the AMR network, or collects the meter reading so that the AMR system can transmit it. The number of AMR systems that support LAN functionality has grown in recent years.

The Commercial and Industrial (C&I) Marketplace

Because most AMR sites are residential, there is often a misconception that the AMR industry has a residential focus. In fact, large numbers of AMR projects start as Commercial and Industrial (C&I) projects and evolve to serve residential customers.

For most utilities (of all types), the most valuable customers are the C&I users. They often generate a high percentage of a utility's revenues and are frequently among the most supportive of the utility. Though there are specialized AMR systems that serve some C&I applications many others are served by the same system that serves residential customers. Some C&I users need more frequent meter readings than other customers, and may therefore be served by a different AMR system.

DETAILED COMMENTS ON N-MCS CONSULTATION

Neptune Technologies Group (Canada) Ltd (Neptune) is pleased to submit comments on this important consultation on the Narrowband MCS (N-MCS) spectrum licensing approach and fees.

Neptune supports Industry Canada's desire to take a more rational and practical approach to the licensing and fee structure for N-MCS systems. As noted in the consultation document, at present the department's fee structure is based on charging fees for each transmitter link using the frequency spectrum and fees vary depending on the frequency band used. With frequency bands becoming more and more interchangeable with the advance of technology, continuing with this outdated fee assessment system is detrimental to the development of meter reading services and undercuts the spectrum efficiency these systems bring to the market.

In typical automatic meter reading systems with base stations (collector terminal) polling and receiving short bursts of data (typically in the millisecond range of duration) from hundred of remote household meter reading devices, the fees prescribed by the Radiocommunication Regulations quickly become astronomical.

In the consultation document, the department provided an example of the city the size of Moncton (ranked as 29th largest Canadian city in the 2006 Statistics Canada Census) to demonstrate this point, noting that under the current fee structure, a wireless automatic meter reading system could attract fees in the range of \$3 million per year for one frequency pair. This clearly is out of sync with any business requirements and causes the delay of the deployment of automatic meter reading systems or, killing this productivity enhancing wireless application or, forcing the meter reading systems to use less effective unlicensed and interference-prone technologies.

This consultation therefore is critical for seeing Canada move to a more logical fee structure for these very efficient systems which will increase the productivity of this sector for years to come.

In 2000, Industry Canada did try to deal with this significant fee problem of N-MCS systems with the issuance of an Internal Procedures Circular² which attempted to ameliorate the fee problem by capping the number of remote stations for which fees could be charged and anchored this to the department's three spectrum congestion areas. This improved the situation for some systems which were simple in design and operation, but had an impact mostly in smaller less congested areas. Neptune qualified for this fee structure in its system in Miramichi, NB.

Ironically, the systems in the largest municipalities (as noted in the following pages), where automation would have the greatest positive impact on productivity, were the hardest hit by the current fee regimes. This is peculiar given that Industry Canada has long been a strong advocate for using ICTs to improve productivity and using its spectrum management powers under the Radiocommunication Act to support the use of wireless technologies to replace manual processes. Yet, its own fee structure was a major barrier to implementing wireless systems that provided productivity improvement across the country.

In addition, though the department does not at this point provide a differentiated fee based on the efficiency of use of frequencies it manages, it is clear that the N-MCS types of systems are much more spectrally efficient than many other wireless systems that use the radio frequency spectrum. Though it may be beyond the bounds of this consultation, Neptune notes that the department's spectrum management policies would more effectively support productivity improvements in Canada's infrastructures if frequencies which were more fully loaded, would attract lower fees.

In this regard Neptune supports the approach to modify licence fees below 1GHz, begun in 1996, in which fees were to be set using factors of the amount of spectrum consumed, exclusivity and the measure of spectrum saturation in the area.

To provide a crude example of the impact of current fees, at the present time, a lightly loaded and intermittently used frequency pair in one of Canada's major cities, in general, would by definition attract much lower fees than a typical N-MCS system such as automatic meter reading wireless application. Ironically, the lightly loaded usage not only returns less economic rent to the public

² IPC 2-1-14 issue 4 May 1, 2000 Narrowband Multipoint Communication Systems (MCS)

through the remission of licence fees but also can often preclude the availability of frequencies for newer and more efficient N-MCS systems through its inefficient use.

Neptune encourages the department to proceed and expeditiously bring to conclusion this necessary consultation, but not lose sight of the “fees to encourage spectrum efficiency” theme as it continues to review its fees.

SPECIFIC COMMENTS AND RECOMMENDATIONS ON N-MCS FEES

As one will see in the next few pages of this report, there are many possible ways to determine fees for this N-MCS service, depending on the formulation used.

- a) Clearly having one fee formulation for N-MCS systems regardless of the frequency band used for high efficiency is progressive and fully supported by Neptune. Industry Canada should be technology and frequencies band neutral in dealing with spectrum management and fee issues.
- b) Existing fee regulations are inappropriate and discriminatory to N-MCS systems as they use channels and stations used to determine fees, while ignoring the high efficiency and narrow bandwidth. While IC continues to license many relatively lightly loaded communications systems licensed in congested areas with low resultant fees, larger N-MCS systems face the double difficulty of accessing frequencies and being charged exorbitant fees due to the large number of stations used to efficiently use a single frequency pair.
- c) This situation is reminiscent to the early days of cellular telephone licensing, when license fees were based on both base stations and mobile units used. In that case, once the number of mobile units grew dramatically, the department took steps to firstly cap the number of mobiles that were used to calculate the cellular fee and then incorporate the total number of station fees in to a spectrum fee. It is as clear to Neptune that the proposed fee structure should be station independent and a spectrum license based on coverage and bandwidth used.
- d) The comparisons of different fee structures noted in the following pages are instructional and show a considerable variation in the fee approach

depending on the methodology used. If one discards the “station dependent” formulations, one is left with the MCS/LMCS/BWA/FWA comparisons identified in section 5.2 of the consultation document. Neptune contends that the only partially comparable band to N-MCS is the MCS band; however, its comparison suffers from a number of key differences. The other bands have too many differences to make them applicable as a key comparison benchmark.

N-MCS and MCS Differences:

- N-MCS band systems are generally single or paired frequencies with a band width of 10 KHz below 1 GHz and under 1 MHz in the microwave bands. The MCS band is roughly 100 MHz and uses much higher bandwidths for delivery of high speed internet services.
 - N-MCS systems are generally much more highly efficient in their use of spectrum.
 - MCS systems are contained within a specific frequency band and generally carrier licensed and used for commercial purposes in selling services to consumers and business. N-MCS systems are flexible in their frequency assignment and are generally used to support automation of manual services by municipalities and those companies who provide services to municipalities. To the extent that market value of the spectrum for these two different services may come into discussion of their fees, Neptune would contend that there is a world of difference in these two frequency bands, and several orders of magnitude between the commercial and market values of these two services.
- e) Neptune therefore suggests that despite the many differences with MCS systems, this fee formulation is likely the closest to N-MCS system in application. Industry Canada has proposed a spectrum licence fee of \$.001/MHz/pop, without any explanation of why it chose that amount given the variation in fees compared. It would appear that the proposal may have simply been a rounding up on the MCS fee. Neptune would contend that there is no sound rationale for such an augmentation in the MCS fee and in fact has made the argument that due to the non carrier N-MCS use of these systems the fee should be much lower. Neptune therefore submits that the fee for N-MCS should not be greater than the most closely related service, MCS. i.e. \$.00052/MHz/pop.

- f) The consultation document advances the notion of a Minimum Fee of \$1000. (“Annual fees will be calculated to the nearest dollar, with a minimum fee of \$1000 for an N-MCS spectrum licence.”). Neptune is at a loss to understand Industry Canada’s reasoning for proposing a minimum fee for these services. It is not clear if it is to try to match current fees for smaller systems or if some other reasoning was the basis for this inclusion. Neptune contends that such a minimum fee is discriminatory to smaller N-MCS systems in less congested areas as it would artificially augment their fees without good economic or spectrum management reason, and therefore suggests it be deleted.
- g) The department suggests a fee based on the \$/MHz/pop. Neptune would content that for commercial services, where the intention is to reach the complete population in the service area (typically for universal mobile applications) such a determination is appropriate. In its development of N-MCS systems however, Neptune has found that for these systems:
- It is not unusual for only a portion of municipalities to install AMR systems in just a portion of their jurisdiction (i.e. just their commercial meters, or just a particular area).
 - The capital costs of completing the entire system as well as the complexity of the project can often stretch out implementation times to years.
 - Other systems may have an adequate technology in one area of town and only choose to complete another area of town where the meter reading technology has reached its useful life.
 - Existing smart meter systems may cover a portion of a city and they only need to expand with a new AMR system in outlying areas.

Because N-MCS systems are more relevant to the number of households in a service area, Neptune contends that the N-MCS spectrum licence fee should be discounted by the average number of people per household (Statistics Canada 206 Census data identifies this as 2.5). Therefore Neptune proposes a fee of .0002/MHz/pop.

- h) One factor not explicitly mentioned in the consultation document is the impact of rollout of an N-MCS system on the licence fees. It is agreed that using a radio station rationale for calculating fees has the advantage of companies paying fees based on the development of the system, i.e. if 50 percent of the stations are deployed; the fees are roughly 50% of the

complete system fees. Moving to a spectrum licence fee formulation has the advantage of making fees more reasonable and affordable but includes full payment for use of the spectrum, when only a small percentage of the system might be deployed in the early years. For commercial systems this may not be a significant issue, as there is a natural incentive to roll out the system quickly to take advantage of the commercial opportunity. For non commercial systems, as many N-MCS systems are dedicated to productivity increase for infrastructure monitoring, often by municipal governments, full spectrum fees prior to complete rollout would be a financial penalty. In Neptune's experience large systems generally take 4 – 6 years to fully implement. Though admittedly slightly more cumbersome to administer, Neptune would support implementation of spectrum licence fees for new systems over a 3 year period, starting at one third of the fee during the first year, two thirds in the second year and the full fee from the third year forward.

- i) For systems which are proposed to be built prior to this new fee structure being implemented, Neptune requests that the department use flexibility in licensing and determining fees. The fact that the department is proposing to move to spectrum licensing rather than apparatus licensing provides the department with more flexibility to quickly license new N-MCS systems prior to a new fee being implemented. Neptune requests that the department move expeditiously to issue spectrum licences for new N-MCS systems to allow infrastructure data collection and monitoring productivity to be taken advantage of. As has been the practice with other developing spectrum licensing structures, fees would be charged when the new fee structure is approved. For its part, Neptune will work with departmental staff to find licensing solutions for its many N-MCS systems foreseen over the coming years.

SPECTRUM POLICY FRAMEWORK FOR CANADA

In June of 2007, Industry Canada issued a key policy which it believed should guide the department in its spectrum management endeavours: The Spectrum Policy Framework for Canada. Though they dealt with the department's regulatory practices and policies, a number of them were very important for the development of an innovative and effective communication sector.

Neptune would like to highlight a selection of these which it believes supports this presentation.

Enabling Guidelines

- *Spectrum should be made available for a range of services that are in the public interest.*

Neptune supports this assertion as it ensures the flexibility of use for spectrum regardless of the frequency band but within normally accepted interference norms. In particular, Neptune has been focusing on the use of the 450 – 470 MHz band in Canada for Automatic Meter Reading (AMR) applications. This is a very popular application in the United States, because of its battery efficient technology and space limitations for aerials (water pit application) as well as a significant amount of cost effective equipment available.

This band is very popular and therefore appears to suffer from significant congestion in major centres across this country. It is a band which appears to be highly licensed but not necessarily highly loaded. That is to say, there may to be a significant number of communications channels in this band which are less than optimally loaded with communications traffic.

In this context, Neptune supports the need to support a wide “range of services” in bands across the radio frequency spectrum and in particular to ensure that applications that use the spectrum more efficiently are afforded the right of access to spectrum over those that do not. Fee based incentives for communications systems in congested areas are but one way to accomplish this.

- *Regulatory measures, where required, should be minimally intrusive, efficient and effective.*

Neptune would like to commend the department in its approach to dealing with N- MCS services across the radio frequency spectrum with its consultation document. It is clear that in its formulation, the focus of the document was on being minimally intrusive, effective and efficient. While Neptune wishes to provide some enhancements and improvements to the department’s proposal, it also requests that the department not diverge from this approach of being minimally intrusive, efficient and effective as it interprets the inputs to this consultation.

- *Regulation should be open, transparent and reasoned, and developed through public consultation, where appropriate.*

Similarly Neptune agrees with Industry Canada's approach to this consultation; the openness to different approaches and the transparency of its reasoning clearly supports this Policy Framework.

- *Spectrum Management practices, including licensing methods, should minimize administrative burden and be responsive to changing technology and marketplace demands.*

The current fee structures for N- MCS systems is outdated, cumbersome and discriminatory to this application compared to traditional mobile services below 1 GHz. There is also a significant administrative and financial burden associated with these types of services which are clearly driven by the marketplace and the need to reduce costs of managing key societal infrastructures. Neptune encourages the department to ensure during the consultation period and possibly lengthy fee setting process under the User Fee Act, that it continues to keep the administrative and financial burden to new N-MCS system operators minimal through the use of spectrum licensing and fees used for spectrum licensed systems that are developing.

SUPPORTING THE GOVERNMENT'S ADVANTAGE CANADA POLICY

Neptune strongly supports the strategy encompassed within the government's Advantage Canada Policy: Building a Strong Economy for Canadians. We agree that regulation is an important tool for encouraging a prosperous economy. We must ensure that Industry Canada has strong and effective regulations to protect people and enhance our quality of life, while minimizing regulations that are unnecessary or that put Canada at a significant competitive disadvantage. This initiative is an important element in promoting better international regulatory cooperation with key trading partners, in particular the United States.

The approach Industry Canada is proposing with this consultation on the new licensing approach and fee for N-MCS will over time, improve cost-

effectiveness and timeliness of the regulatory process as well as strengthening performance and accountability measurement.

USER FEE ACT

The 2004 User Fee Act is a key government measure to ensure that regulatory fees are responsive to business needs and ensure government accountability. Specifically, it requires a regulatory organization to consult its user community in order to:

- (a) take reasonable measures to notify clients, and other regulating authorities with a similar clientele of the user fee proposed to be fixed, increased, expanded in application or increased in duration;
- (b) give all clients or service users a reasonable opportunity to provide ideas or proposals for ways to improve the services to which the user fee relates;
- (c) conduct an impact assessment to identify relevant factors, and take into account its findings in a decision to fix or change the user fee;
- (d) explain to clients clearly how the user fee is determined and identify the cost and revenue elements of the user fee;
- (e) establish an independent advisory panel to address a complaint submitted by a client regarding the user fee or change; and
- (f) establish standards which are comparable to those established by other countries with which a comparison is relevant and against which the performance of the regulating authority can be measured.

Neptune believes that Industry Canada has gone a long way to ensure that the User Fee Act has been fully and appropriately consulted and that the Act's Consultation Requirements have been met. Having undertaken this consultation, it is now incumbent on Industry Canada to make its determinations and then expeditiously complete all remaining requirements of the User Fee Act to seek approval of the licensing approach and fees for N-MCS.

In this regard, it is possible that completion of the User Fee Act requirements will take considerable time. However, time does not stand still for new N-MCS

operators. Therefore Industry Canada needs to be creative in finding new ways of licensing new N- MCS systems to promote the development of these efficient systems and does not destroy business plans through the blind application of outdated and astronomical fees.

INTERNATIONAL FEE STRUCTURES FOR AMR-LIKE SYSTEMS

International fee comparisons are useful to determine approaches taken by other countries and compare them to the Canadian environment. It is clear that the US already has an appropriately low fee based on cost recovery and that both the UK and Australia are attempting to find ways to lower fees for AMR type systems that exhibit significant spectrum efficiency. The countries surveyed as part of this analysis clearly want to encourage and support rather than penalize systems that use the spectrum more efficiently than traditional fixed systems.

It is evident however that the magnitude of the licence fee proposed in Canada must rely on domestic comparisons for its base as opposed to international fees under a different regulatory system. In other words, each country has chosen its own methodology and base line for regulating fees. Canada should learn from the successes of others and then must do the same using its own base line of existing fees, as proposed in the consultation document.

1. US fees for AMR systems

As noted in the consultation document, licence fees in the United States are typically determined on an administrative cost-recovery basis only.

As it would be difficult to make an argument that there is economic rent developed through the use of frequencies for AMR systems, Neptune would encourage the department to set its fee based on strictly an administrative cost-recovery basis.

Neptune's experience in licensing AMR systems in the United States reflects fees which are distinctly advantageous to those being proposed in Canada. Fees for Neptune's AMR systems are summarized as follows:

FCC licences are valid for a 10 year time span.

Coordinator Fees for Frequency Search: \$100/freq pair for area

Frequency Coordination for each collector location- \$100/freq pair (each new location and frequency pair)

FCC Application Fee - \$260.00 (max 6 Collector locations per Application)

Therefore, for a system to cover Moncton, NB assuming one frequency pair and 18 collectors (base stations) the 10 year fee would be \$ US 2680.00 for 10 years or \$ C 300/yr.

2. *United Kingdom*

As noted in the consultation document, the UK regulator OFCOM has been undertaking a comprehensive and systematic review of its licensing and approaches and fees it charges for access to the spectrum.

Licence fees in the UK have historically been charged based on the number of base stations utilizing the frequency spectrum. Following a significant consultation recently, Ofcom has decided its approach of charging fees for multi station business systems will not be depend on the number of base stations used to provide service to a service area.

Neptune believes the approach Industry Canada is taking in this fee consultation is very much in line with the progressive approaches of the UK and other leading world economies.

EXISTING FEE REGULATIONS - DOMESTIC FEE COMPARISONS

Industry Canada uses a number of relevant frequency band comparisons to divine an appropriate fee for the N-MCS spectrum use:

1. Typical fee structure for typical systems in the land mobile bands: \$68/freq pair/ yr regardless of the loading on that frequency pair. This type of fee which has been in place for decades has served the department well as it was a rudimentary measure of use of the spectrum. In short the more channels and frequencies you used, the higher the fee. One of the counter intuitive impacts of this fee however, is that highly efficient systems which communicate with many fixed points attract fees that were never intended to be charged. It clearly is time to modify the approach and basis of the fee for more efficient systems.

2. Licence fee for an N-MCS system operating at 1.4 GHz. The fee schedule is summarized as follows: 1.4 GHz – established as a preferred band for meter reading in Canada in early 2000. Fees as noted below are based on population density per 25 square Km.

The annual radio authorization fee payable in respect of the specified frequencies assigned to a wireless telemetry communications system is for each 1 MHz, or portion thereof, the applicable fee set out in items 1 to 4 of Schedule I for the applicable household density in respect of each cell in the authorized service area.

Item	Household Density of Cell	Annual Fee
1.	2,501 and above	480
2.	from 251 to 2,500	120
3.	from 26 to 250	12
4.	from 0 to 25	6

3. Fees based on Industry Canada’s IPC 2-1-14 issue 4 May 1, 2000
Narrowband Multipoint Communication Systems (MCS)

In response to concerns raised by N-MCS applicants and licensees over the high fee treatment of automatic meter reading types of applications, Industry Canada issues an Internal Procedure Circular in 2000 which lowered the licence fee for wireless systems by capping the number of remote stations that would be used to calculate the licence fee. Area of congestion was a determining factor on how many remotes were to be used in the fee determination.

This was a very progressive move by Industry Canada and certainly had the impact of reducing fees to manageable levels for simple design and smaller systems in less congested areas. As will be shown below, however, these valuable interpretations still did not lower the fees sufficiently for more complex systems in highly congested areas.

4. MCS/LMCS/BWA/FWA fee comparisons

The department has gone to great lengths to bring forward available useful information on fees for various and at least on the surface, similar

bands. All of these fees have been set through an Industry Canada fee determination process over the last ten years and it is not surprising that they fall within an order of magnitude of each other.

The department correctly summarizes the various domestic fee formulations as follows:

Table 2: Current Domestic Licence Fees		
Current Domestic Regimes	Frequency Band	\$/MHz/population
MCS	2500 MHz	0.00052
LMCS	28 GHz	0.0004
BWA	38.4-40.0 GHz	0.00012
FWA	3400-3550 MHz	0.00012

FEE CALCULATIONS BASED ON VARIOUS FEE FORMULATIONS

This consultation document uses a mid-sized market of Moncton to illustrate its proposed fee schedule calculation.

The impact of the fee however is greater depending on the size of the market being served and the population within that service area. To illustrate this, one needs only take the situation of Ottawa, Canada’s 5th largest city, make some realistic assumptions on design of a system to serve the city and determine the effect of the various fee structures.

If one assumes an automatic meter reading system using a single 10 KHz bandwidth frequency pair comprised of 200 collector points (base stations) and 400,000 home based automatic meter reading low power transmitters, one can see the effect of the various fee schedules:

Using current fee schedule in Radiocommunication Regulations:

$$\$68/\text{yr} * 2000 \text{ channels/transmitter} * 200 \text{ transmitters} = \$27.2 \text{ M/year.}$$

An incredible amount for a frequency pair in one city.

Using the N-MCS IPC fee

$\$68 * 200 \text{ base stations} * 48 \text{ (maximum number of remote stations under the IPC)} = \650K/yr.

Even with the “discount” for remote transmitters, quite an uneconomic cost for a frequency pair.

Proposed fee structure assuming a 10 KHz channel below 1 GHz:

$\$.001 \text{ (proposed fee)} * 10 \text{ KHz} * 1.13 \text{ M population} = \$11,300/ \text{ year}$

Over a ten year period = \$113,000.00

The proposed licence fee is for a system which is very much more efficient from a frequency use perspective and has a much higher loading factor than most other frequencies in use in a city the size of Ottawa.

Therefore from a fee reduction perspective, the Gazette notice proposes a fee which is orders of magnitude lower than the existing fee. However, it no doubt is higher than many other less spectrally efficient communications systems using frequencies in the Ottawa area.

THE NEED TO ENCOURAGE AUTOMATION IN KEY INFRASTRUCTURES

Canada’s key infrastructures of water, electricity and gas, largely delivered at the municipal level, are moving towards more monitoring and control using wireless technologies. Provincial and municipal governments have seen the incredible advantage to automating the provision and control of these infrastructures. To some extent the ability of Canada to conserve and effectively use these services will depend on wireless applications.

It is for this reason that Industry Canada, which has been a keen supporter of the use of Information and Communication Technologies (ICTs) in the Canadian marketplace and supporting the development of applications, needs to quickly move forward with the regulatory changes envisioned in this consultation, to ensure that companies who wish to provide these productivity

driving technologies can be immediately, transparently and efficiently rolled out across the country.

With the downloading of services and costs over the last 10 years, municipalities have been hard pressed to drive forward their level of productivity and the resultant cost reductions. N-MCS Technologies such as those provided by Neptune can have a significant impact on municipal productivity, costs and services. The federal government should be providing leadership in its spheres of influence to aid and abet motivated municipal and provincial governments to lower their costs through automation.

Currently, as the consultation notes and Neptune wishes to underline, the department's licensing approach and fee regulations are a key barrier to the development of these services and their inherent productivity enhancing capabilities. The proposed fee modifications advanced by Neptune will in large measure overcome this barrier.

TRANSITION PLAN FOR N-MCS FEES

Neptune submits that the proposed fee schedule as amended above should be implemented with little to no delay. The fee reductions from either the Radiocommunication Regulations fee or the IPC fee are too significant to be delayed by a transition plan.

Neptune submits that for new N-MCS proposals, the fee should be implemented as soon as the fee process under the User Fee Act has been completed. It would appear that under most circumstances existing N-MCS fees will be reduced through this amendment. Should there be cases where there is significant increases of licence fees due to the implementation of these proposed fees, existing licensees should be given the option of paying the existing fees for a three year period before receiving new licences and being charged the new fee.

For systems which are proposed and implemented prior to this new fee structure being implemented, Neptune would encourage the department to use its usual flexibility in licensing and fee determination as it has done in similar circumstances over the years. The fact that the department is proposing to

move to spectrum licensing rather than apparatus licensing provides the department with more flexibility to quickly license new N-MCS systems prior to a new fee being implemented. Neptune would encourage the department to move expeditiously to issue spectrum licences for new N-MCS systems to allow infrastructure data collection and monitoring productivity to be taken advantage of. As has been the practice with other developing spectrum licensing structures, fees would be charged when the new fee structure is approved. For its part, Neptune will work with departmental staff to find licensing solutions for its many N-MCS systems foreseen over the coming years.

APPENDIX A

THE DEPLOYMENT OF NEPTUNE TECHNOLOGY

A. 1-Way Tower Based Systems (Star Network)

A 1-way communication system is one where the transmitters transmit the meter reading data to a Data Collector within transmission range. The Data Collector in-turn uses a communication backbone (GPRS modem, Ethernet connection, Wi-Fi, etc...) to transfer this data back to a central fixed network server.

There is no communication from the office back to the deployed assets (the transmitters or Data Collectors). Certain systems use repeaters or boosters to get a transmitter's reading data back to a Data Collector that is outside of the transmission range of the transmitter or conversely beyond the listening range of a Data Collector. Confirmation of a proper transmitter installation typically takes place the following day after a transmitter is installed as it typically takes a day for the transmitted reading data to make its way to the Data Collector and filtered to the central fixed network server.

Most fixed network deployments require that the data collectors within the cell coverage area to be installed and commissioned prior to the respective transmitter installations in the corresponding cell area. This facilitates the confirmation of proper installation of a transmitter back the fixed network server.

B. 2-Way Tower Based Systems (Star Network)

Two-way communication systems are typically defined in two ways:

Schema A (below): There exists a back and forth communication schema between a Data Collector and the fixed network server but there does not exist a back and forth communication schema between a Data Collector and a transmitter.

Schema B: There exists a back and forth communication schema between a Data Collector and the fixed network server and there is a back and forth communication schema between a Data Collector and a transmitter.

Schema B allows for capabilities of over-the-air programming of not only a Data Collector but also a transmitter(s) all from a central location without the need for a site visit. Feature sets such as modifying a transmitter's reading schedule (one reading per day to 24 readings per day) can be done over-the-air from the fixed network server.

C. Mesh Networks

A Mesh network facilitates the transmission of reading data to a Data Collector through the forwarding of data from one transmitter to another transmitter and eventually making its way to a Data Collector. By design Mesh networks are inherently self redundant in that if a transmitter malfunctions then the reading data is picked up by another transmitter within range where the reading data continues to a Data Collector. Conversely by design Mesh networks require multiple transmissions between transmitters in order for the reading data to be collected by a Data Collector. The chance of signal loss/frequency collision greatly increases with a Mesh network and as such any self redundancy by design is negated by this increase in signal loss/frequency collision resulting in a lower read success rate.

Licensed vs. Unlicensed systems

Fixed Network systems may utilize either an unlicensed frequency transmission system or a licensed transmission system.

Typical unlicensed Fixed Network systems were designed utilizing mobile reading technology and migrating that to a Fixed Network system. Most unlicensed systems are low powered and result in smaller cell size. This requires the deployment of either repeaters, boosters or more Data Collectors. Advantages of an unlicensed system include "plug and play" deployment in that there is no need for application of frequency procurement (which can be time consuming) and annual license fees.

Depending on the transmission schema (multi-channel frequency hopping spread spectrum, single-channel frequency hopping single spectrum, etc) unlicensed Fixed Network systems can be susceptible to interference by other

devices operating in the unlicensed frequency range resulting in lowered read success rate.

Typical licensed Fixed Network systems require the application for a frequency and annual license fees. The application process may be lengthy depending on the geographic area as some densely populated areas (i.e.: the Greater Toronto Area) may be a highly frequency congested area and finding an unused license may prove to be difficult. Advantages of a licensed frequency include:

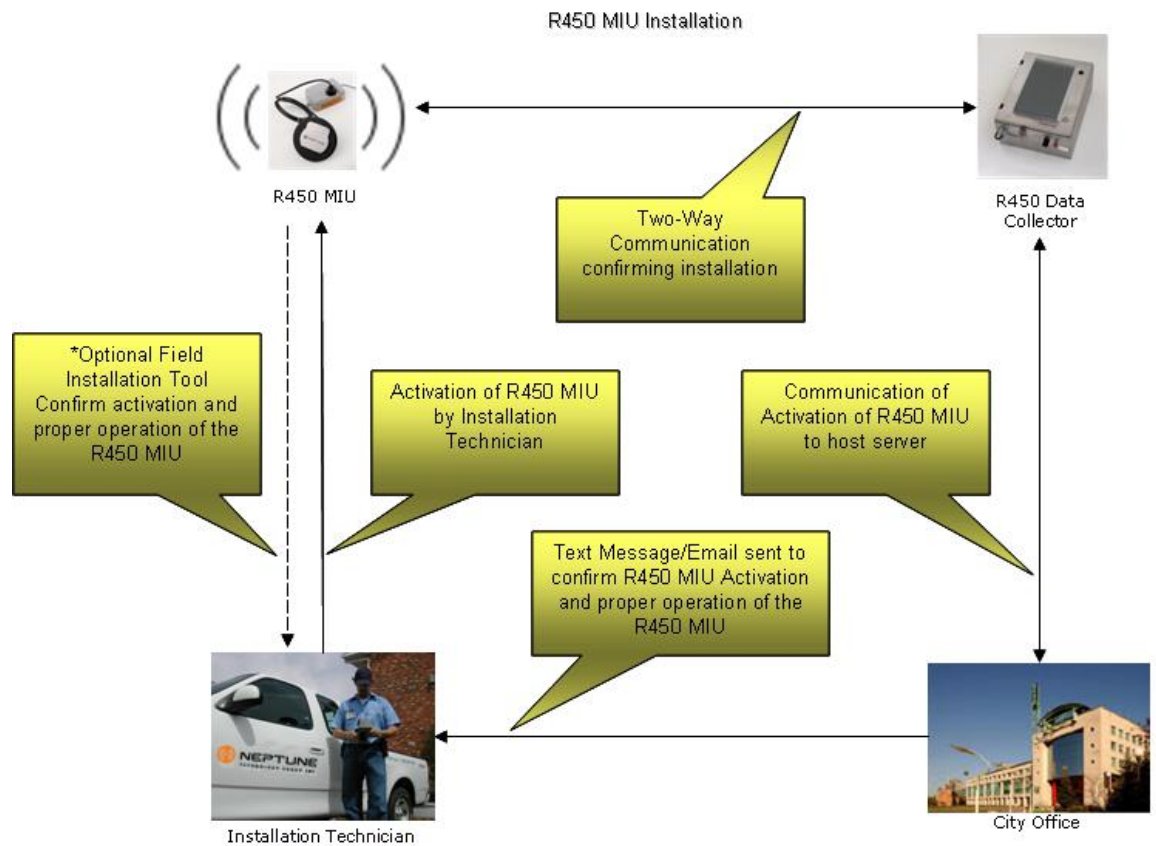
- A protected frequency such that the transmissions from the fixed network system cannot be interfered with by other devices – ensures higher read success rate of the system.
- The ability to transmit with higher power and at a frequency range which can allow for further transmission distances – minimizes the number of Data Collectors while maximizing read success rate of the system.

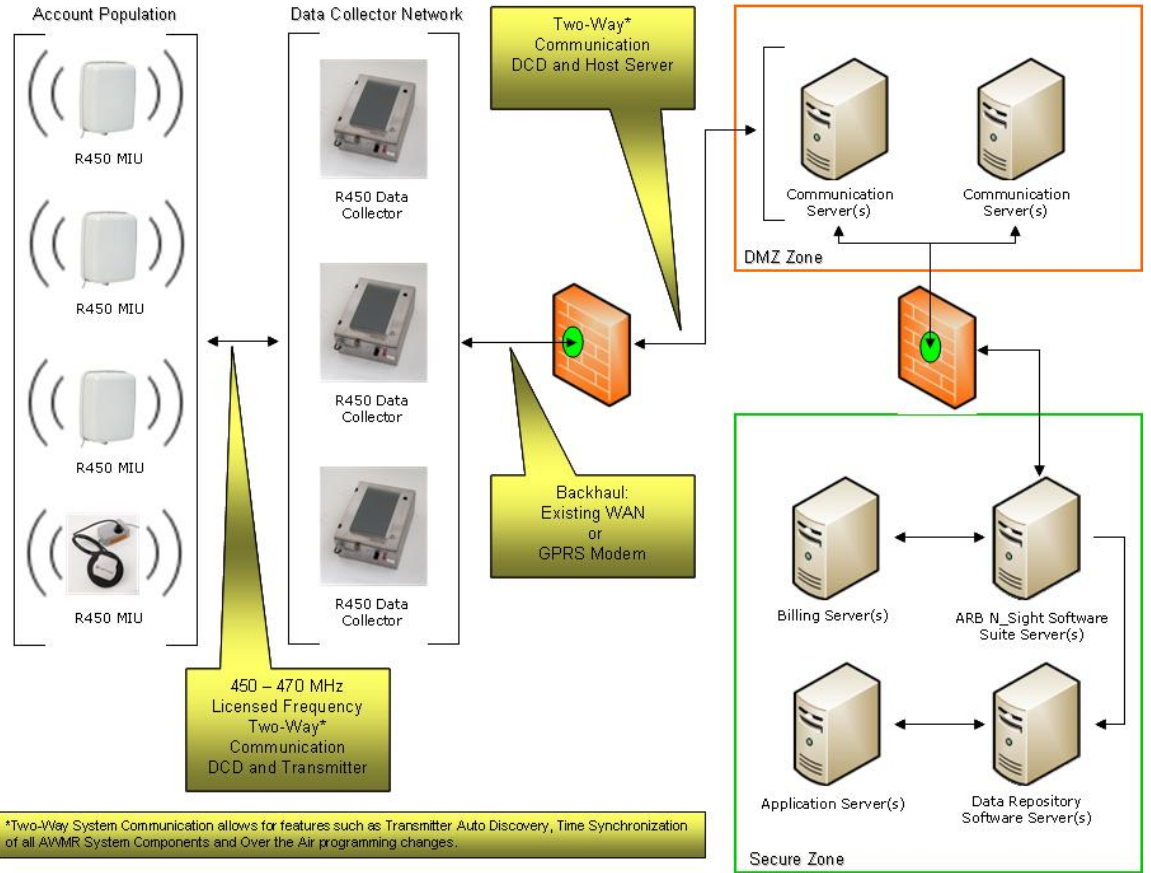
AMR Mobile Technology

- Neptune's ARB R900 Mobile systems are "plug-and-play" type systems which operate in the unlicensed 910-920 MHz range. Transmitters can be installed and verified using handheld or mobile reading devices without the need for license application. Typically transmitters are installed prior to commissioning of the meter reading software.
- Depending on the number of R900 transmitters a customer may wish to install the meter reading software during the project to perform periodic checks on the installation to ensure proper meter and transmitter operation. However this is not a requirement but a suggestion. If Neptune is performing the installation project then it is part of our installation methodology to perform period testing of groups of transmitters and finally a complete check at the end of the project to ensure that all R900 transmitters are functioning prior to closing out of the project.

AMI Fixed Network Technology

- Neptune's ARB R450 Fixed Base system operates in the licensed 450 – 470 MHz frequency range and is a full 2-way licensed communication system down to the transmitter. All the components within the system can communicate between each other. The Data Collector(s) is typically installed and commissioned prior to the transmitters being installed. Having a full 2-way system and the Data Collectors already installed facilitates the self discovery of fixed network transmitters. Installation technicians have the ability to discover while on-site performing the transmitter installation if a transmitter has been installed correctly and if the reading data is going to be successfully transmitted to a Data Collector. The following diagrams depict the ARB Fixed Base typical setup and installation schema.





WAN Architectures DCDs Equipped with GPRS Cellular Modems

