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Spectrum Management

Radio Systems Policy

Policy for the Licensing of Very Low Capacity Point to Point Links in the Band 30-890 MHz

See also:

DGTP-005-96 Proposed Spectrum Utilization Policy to Support a Mix of Integrated Mobile and Fixed Service Applications in Certain Frequency Bands Below 960 MHz

SMSE-009-04 Release of Standard Radio System Plan 500, Provisional, Technical Requirements for Land Mobile and Fixed Radio Services Operating in the Bands 138-144 MHz and 148-174 MHz (SRSP-500)

SMSE-001-05 Redeployment Plan (100-500 MHz) - Temporary Moratorium of Phase 2 Radio Equipment Certification and Licensing Requirements SMSE-001-05 - Redeployment Plan (100-500 MHz) - Temporary Moratorium of Phase 2 Radio Equipment Certification and Licensing Requirements

SP 462/467 MHz Spectrum Provisions for Introducing Licence-Exempt Radios in the Land Mobile Frequency Sub-bands 462/467 MHz

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1. Intent

The intent of this paper is to state the radio systems policy for the licensing of Very Low Capacity (VLC) point-to-point links in the band 30-890 MHz to be used by the Department in authorizing such systems. A VLC point-to-point system, for the purpose of this policy, is defined as that for which the maximum authorized bandwidth must not exceed the equivalent bandwidth of the six RF mobile channels. (Depending on the band under consideration, an RF mobile channel width could be 20, 25 or 30 kHz).

2. Introduction

The Department of Communications has reviewed the use of VLC point-to-point links in the frequency range 30-890 MHz with the objective of formulating policy guidelines. The increased demand for spectrum by mobile services in this frequency range for VLC links, the existence of other viable linking alternatives and the efficiency of spectrum use by such links were all considered during this review. After internal review and discussion with current VLC link users, the Department announced the issue of a set of policy proposals in a paper entitled "Proposed Policy for the Licensing of Very Low Capacity (VLC) Point-to-Point Links in the Band 30-890 MHz" for public comment on October 23, 1982, in the Canada Gazette. After a review and analysis of the submissions received, the Department is now issuing this radio systems policy.

3. Policy Guidelines

The general policy will continue to be to authorize radio links only in cases where technical or operational justification supports such assignments and alternatives are unavailable or impractical.

3.1 Areas

For the purposes of applying this policy the Department has divided the country into three geographical areas, namely:

(a) **Areas of Intensive Mobile Use:**

These areas are generally within 120 km of the centres of: Montreal, Toronto, Hamilton, London, Windsor, Kitchener, St. Catharines/Niagara Falls, Oshawa, Edmonton, Calgary and Vancouver/Victoria.

(b) **Areas of Moderate Mobile Use:**

These are generally the areas within 120 km of the centres of: St. John's, Halifax, Saint John, Chicoutimi - Jonquière, Quebec, Sherbrooke, Ottawa-Hull, Sudbury, Thunder Bay, Winnipeg, Regina and Saskatoon.

(c) **Areas of Light Mobile Use:**

This includes all areas not specified in (a) or (b) above where spectrum congestion for the mobile service in the frequency bands below 470 MHz is not expected to be a critical factor for the foreseeable future.

3.2 Frequency Bands

Frequencies from the bands allocated to the fixed service on a primary exclusive or shared basis, as listed in Annex A, if available, will be authorized first. The frequency band 216-220 MHz is allocated to the Fixed and Maritime Mobile services on a primary basis. Due to the potential utilization of this band by the Maritime Mobile service, links will not be authorized in areas with 170 km from navigable Canadian waters. In the moderate and light mobile use areas, in bands below 470 MHz where the Fixed service is allocated on a secondary basis to the Mobile service, VLC links may also be authorized. In the band 806-890 MHz allocated to the fixed service on a secondary basis, no fixed links will be authorized in the areas of intensive and moderate mobile use. In the bands 821-825 MHz and 866-870 MHz no links will be authorized until a decision is made whether or not to proceed with the mobile satellite demonstration system.

Due to spectrum congestion in areas of intensive mobile use, applications requiring linking may have no alternative other than the use of spectrum above 890 MHz. The "Policy for the Utilization of the 0.890-10.68 GHz Radio Spectrum by the Fixed Service", published in December 1982, gives the spectrum utilization policy and identifies certain bands which can be used for VLC links. Alternatively non-radio facilities could be used for such linking requirements.

3.3 Spectrum Required

In areas of intensive and moderate mobile use, normally systems requiring contiguous bandwidth in excess of that which could be accommodated within a single normal mobile channel spacing used in the band under consideration (20, 30 or 25 kHz depending on the band) should use frequencies above 890 MHz. In areas of light mobile use, the bandwidth permitted below 890 MHz normally should not exceed 90 kHz for a contiguous assignment.

3.4 The Public Good/Service to the Public

In considering what constitutes the "public good" with respect to the use of VLC links, operations using links to provide and extend services to the greatest number of users or subscribers are to be given preference in frequency assignments. Based on the above, the guidelines for VLC links for radio paging systems are less restrictive than those required to extend coverage of a two-way mobile radio operation because of paging's potential to satisfy a larger number of subscribers with relatively little spectrum. On the same basis, preference for the use of VLC links might also be given to proposed paging or mobile radio systems using greater technical sophistication to increase the efficiency of frequency use and hence the number of subscribers served. In paging systems, this might lead to a preference for digital over tone-only, and tone-only over tone and voice systems in the assignment of frequencies for VLC links. Similarly, a preference will be afforded to public access systems (ones which provide service to subscribers) rather than private systems whose use is limited to their own group of users.

3.5 Licensing Considerations

VLC links radio systems are now and will continue to be licensed on either a primary or secondary basis depending on the status of the fixed service allocation in the band in question. (Refer to Annex A "Categories of Service" for definition.) In cases where a link has been authorized on a secondary basis and subsequently the link frequency is required to support the growth of a service allocated on a primary basis in the same band (i.e. mobile), the licensee of the link may be required to relinquish his assignment. In such cases, the licensee of the link will receive a two year notification, at the end of which the link frequency will be made available for use of the primary service. The Department will do the utmost to reaccommodate the link requirement within the terms of this policy.

Systems using more than one mobile channel and/or using modulation techniques not specified in the existing radio standards will be evaluated on a case by case basis until such time as appropriate standards are developed.

The inclusion of a notation on the licence is being considered to indicate the status (primary or secondary) of the assignment for the information of licensees. This provision may be implemented in future licence system revisions.

3.6 Technical Considerations

The following DOC documents describe the procedures for obtaining approval of radio systems for some of the bands below 890 MHz. These documents are:

- Radio Standards Procedure (RSP) 101;
- Standard Radio System Plan (SRSP) 501 Issue 2 (Provisional) for the bands 406.1-430 MHz and 450-470 MHz;
- Standard Radio System Plan (SRSP) 502 (Provisional) for the bands 806-821/851-866 MHz.

If required, these documents will be revised or new ones issued to implement the final policy for VLC links. In the meantime Annex B may be used as a guide.

3.7 Licensing Guidelines for the Various Operations

(see Chart 1 for Summary)

In this section, guidelines are detailed for VLC links as required in support of a variety of operations. To ensure maximum utilization of the link frequencies, time-sharing among current and future users is encouraged when practicable.

3.7.1. Public Radio Paging (see Chart 1 for Summary) - The following guidelines apply to the use of VLC links for public radio paging such as that provided by the common carriers or the restricted common carriers.

i) Areas of Intensive Mobile Use/Public Radio Paging

In the frequency range 30-470 MHz, subject to the availability of spectrum, up to three channels may be authorized to each licensee for VLC linking if the link transmitting station is located within an area of intensive mobile use. These link frequencies should be selected from the bands for which the fixed service has exclusive primary allocation. The links will be authorized on a preferred basis to paging systems which would provide or have the capability to provide maximum service to the public and/or use spectrally efficient techniques (e.g. digital, tone, etc).

ii) Areas of Moderate Mobile Use/Public Radio Paging

In the frequency range 30-470 MHz, subject to the availability of spectrum, up to three channels may be authorized to each licensee of a public radio paging system. Frequencies should be selected from the bands in order of use as given in Annex A. The links should be authorized on a preferred basis to paging systems which would provide maximum service to the public using spectrally efficient techniques.

iii) Areas of Light Mobile Use/Public Radio Paging

Subject to the availability of spectrum, up to six channels may be authorized to each licensee of a public radio paging system in any band allocated to the Fixed and Mobile services.

3.7.2. Private Radio Paging (see Chart 1 for Summary) - Private paging systems are either of an "in-plant" type or provide "city-wide" coverage for the sole use and benefit of the licensee. Where private paging systems can demonstrate an equivalent spectral efficiency to public systems, they may, on a case by case basis, be afforded equivalent consideration to public systems in their use of linking frequencies. In all other cases, the following guidelines will be used for private systems.

i) Areas of Intensive Mobile Use/Private Radio Paging

In the frequency range 30-890 MHz fixed links for private paging systems will not normally be authorized except under the conditions as outlined above.

ii) Areas of Moderate Mobile Use/Private Radio Paging

In the frequency range 30-470 MHz, subject to the availability of spectrum, up to two channels may be authorized to each licensee of a private radio paging system. Frequencies should be selected from the bands in the order of use as given in Annex A.

iii) Areas of Light Mobile Use/Private Radio Paging

Subject to the availability of spectrum, up to six channels may be authorized to each licensee of a private radio paging system in any band allocated to the Fixed and Mobile services.

3.7.3. Private Commercial Service (see Chart 1 for Summary) - The private commercial service is a service provided by land and/or mobile stations for the handling of private communications of the licensee.

i) Areas of Intensive Mobile Use/Private Commercial Service

(a) Because of the large and increasing demand for spectrum by mobile radio users below 890 MHz, radio linking of land stations for private commercial systems will not normally be authorized in these areas.

(b) Regarding spectrum above 890 MHz, the frequency bands allocated to the fixed service on a primary basis and designated for VLC links may be used for radio links.

ii) Areas of Moderate Mobile Use/Private Commercial Service

In the frequency range 30-470 MHz, subject to the availability of spectrum, one paired channel may be authorized to each licensee of a private commercial system. Frequencies should be selected from the bands in the order of use as listed in Annex A.

iii) Areas of Light Mobile Use/Private Commercial Service

Subject to the availability of spectrum, up to six paired channels may be authorized to each licensee of a private commercial mobile radio system in any band allocated to the Fixed service in the range 30-890 MHz.

3.7.4 Restricted Common Carrier Mobile Radio Service (RCCMRS)

(see Chart 1 for Summary)

This is a service provided by an operator to groups of subscribers for the dispatch of their mobiles. These systems, because of their capability of providing service to a diverse range of public users, are generally spectrally more efficient than a private mobile radio system and, for this reason, the policy guidelines are more permissive. The following policy guidelines will be used for the authorization of radio links between RCCMRS operations in the neighbouring areas.

i) Areas of Intensive Mobile Use/RCCMRS

Because of the large and increasing demand for spectrum by mobile radio users below 890 MHz, and due to considerations of spectral efficiency, no channels will be authorized to link RCCMRS operations in the areas of intensive mobile use.

ii) Areas of Moderate Mobile Use/RCCMRS

In the frequency range 30-470 MHz, subject to the availability of spectrum, one paired channel for linking may be authorized to each licensee of an RCCMRS operation for the extension of services into the surrounding areas. Frequencies should be selected from the bands in the order of use as listed in Annex A. The links should be authorized on a preferred basis to systems providing the most service to the public.

iii) Areas of Light Mobile Use/RCCMRS

Subject to the availability of spectrum, up to six paired channels may be authorized to each licensee of an RCCMRS operation for the extension of services into surrounding areas. Frequencies should be selected from any band allocated to the Fixed and Mobile services.

3.7.5 Government Services

(see Chart 1 for Summary)

The following guidelines will be used for the authorization of VLC links in support of services provided by federal, provincial and municipal governments and public utilities which are exclusively related to safety of life, property or protection of natural resources. Other government services outside these priority categories will be authorized links on the same basis as the Restricted Common Carrier Radio Service noted in Section 3.7.4.

All areas (only for services exclusively related to safety of life, property or protection of natural resources).

In the frequency range 30-470 MHz, subject to the availability of spectrum, up to six paired channels may be authorized for the operations of departments or agencies. Frequencies should be selected from the bands in order of use as listed in Annex A. Sharing among various government users will be encouraged on linking frequencies which are not fully utilized and are not required for exclusive usage. Users of large systems requiring more than six channels will be encouraged to utilize spectrum efficient technology and spectrum above 890 MHz.

3.7.6 Broadcast Auxiliary Services

The usage of the frequency bands 450-451 MHz and 455-456 MHz as noted in the Department's UHF Allocation Policy entitled, "Spectrum Allocation Policy in the 406-960 MHz Frequency Band" and as identified in Standard Radio System Plan (SRSP) 501 (Issue 2 Provisional) will be retained for broadcast auxiliary services (e.g. AM monaural studio transmitter links, broadcast pick-up etc.). In those areas where frequencies are no longer available in the two frequency bands set aside for this use and in all cases where AM stereo broadcasting has been introduced, spectrum above 890 MHz should be considered. Due to the nature of the broadcasting service, it is not considered practical to authorize such VLC links on a secondary basis in any band below 890 MHz.

4. Implementation

This policy will become effective on October 1, 1983. As an interim technical guideline given in Annex B will be used with the existing technical documents listed in section 3.6 for authorization of VLC links until all documents have been updated.

Issued under the authority of
the Minister of Communications

V. Hill
Director General
Telecommunications Policy Branch

Annex A

**List of Frequency Allocations for Fixed and Mobile
Services in the Frequency Range 30-890 MHz**

Order of Use	Frequency Band		Primary Allocation	Secondary Allocation
	From	To		
3	30.01	50 MHz	MOBILE	Fixed
*2	72	76 MHz	FIXED, MOBILE	
2	138	144 MHz	FIXED, MOBILE	
2	148	149.9 MHz	FIXED, MOBILE	
3	150.05	156.7625MHz	MOBILE	Fixed
**3	156.7625	174 MHz	MOBILE	Fixed
2	216	220 MHz	FIXED, MARITIME MOBILE	
4	401	406 MHz	OTHERS	Fixed, Mobile (except aeronautical mobile) Fixed Mobile
**3	406.1	414 MHz	MOBILE	Fixed
1	414	415 MHz	FIXED	Mobile
3	415	419 MHz	MOBILE	Fixed
1	419	420 MHz	FIXED	Fixed
**3	420	430 MHz	MOBILE	Fixed
3	450	470 MHz	MOBILE	
***	806	890 MHz	MOBILE	
****		Above 890 MHz		

Categories of Services:

1. Services the names of which are printed in capital letters, (e.g. FIXED) are primary services.
 2. Services the names of which are printed in normal characters, (e.g. Fixed) are secondary services.
 3. Stations of a secondary service:
 - a) shall not cause harmful interference to stations of a primary service to which frequencies are already assigned or to which frequencies may be assigned at a later date;
 - b) cannot claim protection from harmful interference from stations of a primary service to which frequencies are already assigned or may be assigned at a later date;
 - c) can claim protection, however, from harmful interference from stations of the same or other secondary service(s) to which frequencies may be assigned at a later date.
- * Frequency bands 73-74.6 MHz, 74.8-75.2 MHz and existing model control frequencies are not available for fixed links. Consideration in making fixed assignments in this range may have to be given to protection of reception of TV channels 4 and 5.

- ** Frequency bands 156.7625-161.535 MHz, 409-410/420-421 MHz, 421.0-422.175 MHz, 426.0-427.175 MHz, 425.0-426.0 MHz, should be avoided for fixed links.
- *** In order to avoid any compromise with the development of mobile services in the band 806-890 MHz, no fixed links will be authorized in this band in the areas of intensive and moderate mobile use.
- **** The "Policy for the Utilization of the 0.890-10.68 GHz radio spectrum by the fixed service" and RSP 113 will be used for the authorization of VLC point to point links above 890 MHz.

Annex B

Interim Supplementary Technical Criteria to Existing Documents

Antenna Directivity and Polarization - With the exception of point to multipoint links, all other fixed point to point links must use directional antennas with a minimum gain with respect to half wave dipole of 9 dB in the VHF band (30-300 MHz) and 12 dB in the UHF band (above 300 MHz). Lower gain antennas may be permitted where they provide equivalent re-use of frequencies through control of front-to-back ratio. In order to use a common frequency for all links within a point to multipoint system, omnidirectional or other antenna patterns with large beamwidth would be permitted for such applications on a secondary basis, as long as the re-assignment of the same frequency is not affected due to the use of the non-directional antenna. Antennae horizontally polarized must be used in all cases unless operational requirements justify vertical polarizaition.

Bandwidth Considerations - Within the single normal mobile channel spacing used in the band under consideration, one or more discrete frequencies or multiplexed channels may be employed, provided that the total emission bandwidth can be accommodated. As noted in Section 3.3, contiguous bandwidths in excess of a single normal mobile channel but less than 90 kHz may be employed below 890 MHz only in areas of light mobile use.

Single voice channel FM or PM equipment shall meet the requirements specified in Radio Standards Specifications (RSS) 119 (and its Supplement if applicable). Equipment using modulation techniques other than FM or PM or using multiplex channels within a single normal mobile channel bandwidth will be certified in the interim using RSS 119 as a guide, on the basis of the engineering brief submitted; until such time as specifications are developed for such equipment.

Number of Hops - There are no restrictions on the number of hops to be authorized. They should be based on the type of service (e.g. paging or two-way system), proposed system configuration and availability of spectrum. Also, systems requiring multiple hops should be designed to optimize spectrum utilization.

Effective Radiated Power and Antenna Height - The effective radiated power (ERP) will be limited to that necessary to provide the required service as governed by the system requirements. To this end, restrictions will be applied to the ERP, antenna polarization/antenna directivity and antenna height above ground level.

Chart 1

System	Areas of Intensive Mobile Use	Areas of Moderate Mobile Use	Areas of Light Mobile Use
Public Radio Paging (Common Carrier and RCC Provided Paging)	<p style="text-align: center;">30-890 MHz</p> <ul style="list-style-type: none"> - fixed primary, mobile secondary bands only if spectrum available; - up to three channels; - time-sharing of frequencies between current and future users encouraged; - preference given to systems providing maximum service to public (i.e., digital, tone only, tone and voice) 	<p style="text-align: center;">30-890 MHz</p> <p>Order of Use:</p> <ol style="list-style-type: none"> 1. fixed primary and mobile secondary bands; 2. fixed and mobile primary bands; 3. fixed secondary, mobile primary bands; 4. fixed and mobile secondary, others primary; <ul style="list-style-type: none"> - up to three channels; - preference given to systems providing maximum service to the public; - time-sharing of frequencies; encouraged. 	<p style="text-align: center;">30-890 MHz</p> <ul style="list-style-type: none"> - up to six channels in any band allocated to fixed, and/or mobile, primary or secondary.
Private Radio Paging	<p style="text-align: center;">30-890 MHz</p> <ul style="list-style-type: none"> - no fixed links. 	<p style="text-align: center;">30-890 MHz</p> <ul style="list-style-type: none"> - fixed primary bands only; - up to two channels. 	<p style="text-align: center;">30-890 MHz</p> <ul style="list-style-type: none"> - up to six channels in any band allocated to fixed and mobile.
Private Commercial	<p style="text-align: center;">30-890 MHz</p> <ul style="list-style-type: none"> No fixed links. 	<p style="text-align: center;">30-890 MHz</p> <p>Order of Use:</p> <ol style="list-style-type: none"> 1. fixed primary and mobile secondary bands; 2. fixed and mobile primary bands; 3. fixed secondary, mobile primary bands; <ul style="list-style-type: none"> - time-sharing encouraged - one paired channel 	<p style="text-align: center;">30-890 MHz</p> <ul style="list-style-type: none"> - up to six paired channels in any band allocated to fixed services

RCCRMS	30-890 MHz No fixed links.	30-890 MHz Order of Use: 1. fixed primary and mobile secondary bands; 2. fixed and mobile primary bands; 3. fixed secondary and mobile primary bands; 4. Fixed and mobile secondary, others primary; - one paired channel - preference given to systems providing maximum service to the public - time-sharing encouraged	30-890 MHz - up to six paired channels in any band allocated to fixed and mobile services
Government Services*	30-890 MHz 1. fixed primary and mobile secondary bands; 2. fixed and mobile bands primary; 3. fixed secondary and mobile primary bands; 4. Fixed and mobile bands secondary, others primary; - up to six paired channels per department or agency; - sharing among government users is encouraged on links but not required for exclusive use.	30-890 MHz 1. fixed primary and mobile secondary bands; 2. fixed and mobile primary bands; 3. fixed secondary and mobile primary bands; 4. Fixed and mobile bands secondary, others primary; - up to six paired channels per department or agency; - sharing among government users is encouraged on links but not required for exclusive use.	30-890 MHz - up to six paired channels per department or agency in any band allocated to fixed and mobile services
Broadcast Auxillary	The bands 450-451 MHz and 455-456 MHz as indicated in SRSP-501 are available for all areas.		

* See Section 3.7.5 for restrictions.

Note: Radio linking is permitted in the band 216-220 MHz only in areas 170 km from navigable Canadian waters.

