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SRSP-312.7

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Spectrum Management and Telecommunications

Standard Radio System Plan

Technical Requirements for Radio Systems Operating in the Fixed Service, in the Band 12.7-13.25 GHz

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Preface

Issue 2 of SRSP-312.7 has been released to reflect policy changes in Canada Gazette notice SMSE-022-14, *Decisions on Spectrum Utilization Policies and Technical Requirements Related to Backhaul*, released in December 2014.

Issued under the authority of
the Minister of Innovation, Science, and Economic Development

Martin Proulx
Director General
Engineering, Planning and Standards Branch

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1. Intent

This Standard Radio System Plan (SRSP) states the minimum technical requirements for the efficient use of the frequency band 12.70 - 13.25 GHz by [line-of-sight radio systems in the fixed service](#), namely:

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- [Bidirectional point-to-point radio systems using digital modulation \(12.7-13.2 GHz\)](#)
- [Very High Capacity Microwave \(VHCM\) point-to-point and point-to-multipoint systems used for the distribution of CATV signals \(12.7-13.2 GHz\)](#)
[ISED note for the RABC: Feedback is sought from the RABC on the evolution of VHCM. Do modern VHCM systems require a point-to-multipoint structure? Can modern VHCM systems be implemented under the technical requirements of point-to-point radio systems? Will modern VHCM be limited to carrying CATV signals only? Is modern VHCM unidirectional or bidirectional?]
- [TV studio-to-transmitter links \(12.7 – 13.2 GHz\)](#)
- [ISED note for the RABC: Feedback is sought from the RABC on the evolution of TV STL in this band. Does this band remain suitable for TV STL operation? What are the technical parameters of modern TV STL systems in this band?]
- [TV Pick-up \(13.15-13.25 GHz\)](#)
- [ISED note for the RABC: Feedback is sought from the RABC on the evolution of TV Pick-up in this band. Does this band remain suitable for TV Pick-up operation? What are the technical parameters of modern TV Pick-up systems in this band?]

This SRSP is intended to be employed in the design and specification of radio systems and equipment, [as well as](#) in the [technical](#) evaluation of applications for new radio facilities or modification to radio systems submitted in accordance with the current issue of Radio Standards Procedure [RSP-113, Application Procedures for Planned Radio Stations Above 960 MHz in the Fixed Service](#).

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This SRSP specifies equipment characteristics relating to efficient spectrum usage only and is not to be regarded as a comprehensive specification for equipment design and/or selection.

2. General

2.1 Revisions

[This standard replaces SRSP-312.7, Issue 1. Further revision](#) of this SRSP will be made as required.

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2.2 Spectrum Licensing Process

[Existing radio systems operating in the band 12.7-13.25 GHz that were licensed as standard prior to the issuance of this SRSP may continue to operate as standard. Modifications to these systems will be considered by the Department on a case-by-case basis. New systems deployed in the band 12.7-13.25 GHz must conform to the requirements of this standard.](#)

Radio systems conforming to these technical requirements will be given priority in licensing over non-standard radio systems operating in this band.

[The arrangements for non-standard systems are outlined in SP GEN, General Information Related to Spectrum Utilization and Radio Systems Policies.](#)

[The Geographical Differences Policy \(GDP\) guideline applies in this frequency band. More information on the GDP can be found in SP 1-20 GHz.](#)

[For bidirectional point-to-point digital radio systems, the use of a two-frequency plan is required. Where reasonable economic or technical justification is provided \(e.g. where siting prevents adequate antenna discrimination\), extra frequencies may be used to resolve the problem, subject to the provisions of the GDP as referenced in Section 2.5.](#)

2.3 Resolution of Interference Conflicts Between Radio Systems

When potential conflicts between radio systems cannot be resolved by the parties concerned, the Department should be advised. [After consultation with these parties, the Department will determine the necessary modifications and schedule of modifications to resolve the conflict.](#)

[Even though a radio system conforms with the requirements of this SRSP, modifications may be required to the system whenever harmful interference¹ is caused.](#)

[In cases of a potential interference conflict, the Department may require licensees and/or applicants to use a receiver with improved selectivity characteristics.](#)

2.4 Spectrum Sharing

It should be noted that the fixed service shares this band [with other services in accordance with the Canadian Table of Frequency Allocations 9 kHz to 275 GHz.](#)

[Notably, the band also has a primary allocation for the fixed-satellite service \(FSS\) \(Earth-to-space\). Information on FSS earth stations transmitting in this band is available through the Department's Spectrum Management System web page. Licensees and applicants for the deployment of fixed service and FSS earth stations shall coordinate their installations on a first-come first-serve basis.](#)

2.5 TV Studio to Transmitter Link Radio Systems

1 [For the purposes of this SRSP, "harmful interference" means interference that endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs, or repeatedly interrupts a radiocommunications service operating in accordance with regulations and technical requirements laid down by the Minister of Industry under the Radiocommunications Act.](#)

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Radio systems used for television broadcasting studio-to-transmitter link (STL) services are permitted in the band 12.7-13.2 GHz. All STL systems must conform with the applicable provisions for point-to-point digital radio systems provided in this SRSP. Authorized bandwidth of STL systems shall not exceed 6 MHz.

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3. Related Documents

The current issues of the following documents are applicable, and are available on the Department's Spectrum Management and Telecommunications website at <http://www.ic.gc.ca/spectrum>.

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- SP GEN *General Information Related to Spectrum Utilization and Radio Systems Policies*
- RSP-113 *Application Procedures for Planned Radio Stations above 960 MHz in the Fixed Service*
- TRC-43 *Designation of Emissions (Including Necessary Bandwidth and Classification), Class of Station and Nature of Service*
- ICES-008 *Cable Distribution Networks*
- CTFA *Canadian Table of Frequency Allocations 9 kHz to 275 GHz*
- CPC-2-0-03 *Radiocommunication and Broadcasting Antenna Systems*
- SP 1-20 GHz *Revisions to Microwave Spectrum Utilization Policies in the Range of 1-20 GHz*
- SP 3-30 GHz *Revisions to Spectrum Utilization Policies in the 3-30 GHz Frequency Range and Further Consultation*
- SMSE-022-14 *Decisions on Spectrum Utilization Policies and Technical Requirements Related to Backhaul*
- Arrangement A *Arrangement between the Department of Transport and the Federal Communications Commission for the Exchange of Frequency Assignment Information and Engineering Comments on Proposed Assignments along the Canada-United States borders in certain bands above 30 mc/s*

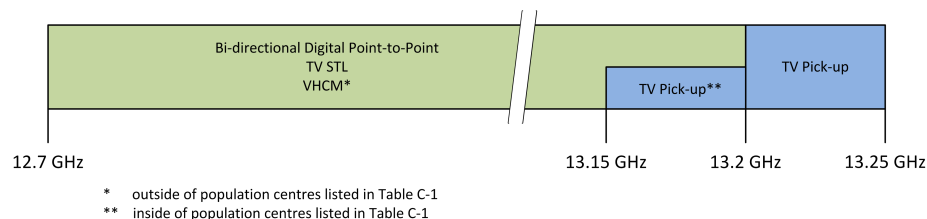
SP – Spectrum Utilization Policy
RSP – Radio Standards Procedure
TRC – Telecommunications Regulation Circular

[CTFA – Canadian Table of Frequency Allocations](#)
[CPC – Client Procedures Circular](#)

4. Overview of the Use of the Band by the fixed service

A summary of the use of the band 12.7-13.25 GHz is shown in Figure 1.

Figure 1 – Utilization of the Band 12.7-13.25 GHz



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4.1 Definitions

Bidirectional Digital Point-to-Point Digital Radio System – A fixed radio-communication system used to relay digital information directly between two fixed points, in both directions.

TV Studio-to-Transmitter Links (STL) – A fixed radio-communications system used to relay television program material and related communications from the studio to the transmitter site of a television broadcast station.

Very High Capacity Microwave (VHCM) – A fixed service radio-communications system for the transmission of four or more television signals for the purpose of CATV distribution.

TV Pick-up – A fixed service between a temporary remote television camera location and the studio. A TV Pick-up may consist of a camera to transportable studio link (transportable to transportable) and a transportable studio to TV broadcast studio link (transportable to point).

Channel spacing – frequency separation between centre frequencies of adjacent channels within the same channel plan.

4.2 Geographical sharing

Licensing of new VHCM systems is limited to geographical locations outside of population centres listed in Table C-1 of Annex C. Modifications to existing VHCM

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systems located within population centres listed in Table C-1 of Annex C will be considered on a case-by-case basis at the discretion of the Department's regional offices.

The 13.15-13.20 GHz portion of the band is shared on a geographical basis. Within population centres listed in Table C-1 of Annex C, preference will be given to TV-STL and TV Pick-up systems over bidirectional digital point-to-point and VHCM systems.

5. Radio Frequency (RF) Channel Arrangement Description

5.1 RF Channel Arrangements for Bidirectional Point-to-Point Digital Radio Systems

The channel plans defined in this standard provide for five different RF channel spacings. Channel pairs are provided with a common transmit/receive separation of 225 MHz.

The allowable channel bandwidths are:

- Less than or equal to 5 MHz
- Greater than 5 MHz and less than or equal to 8.33 MHz
- Greater than 8.33 MHz and less than or equal to 12.5 MHz
- Greater than 12.5 MHz and less than or equal to 25 MHz
- Greater than 25 MHz and less than or equal to 50 MHz

5.1.1 RF Channel Centre Frequencies

5.1.1.1 5 MHz bandwidth channels

The centre frequencies of the 45 paired channels which allow RF channel bandwidths less than or equal to 5 MHz are expressed by the following relationships:

$$\begin{array}{ll} \text{Lower half of the band} & A_n = 12697.5 + 5n \quad \text{for } n = 1 \text{ to } 45 \\ \text{Upper half of the band} & A'_n = 12922.5 + 5n \quad \text{for } n = 1 \text{ to } 45 \end{array}$$

Where n is the channel number and A_n and A'_n are the centre frequencies in MHz of the paired channels. The 45 centre frequencies for the paired channels are summarised in Annex B, table B-1.

5.1.1.2 8.33 MHz bandwidth channels

The centre frequencies of the 26 paired channels which allow RF channel bandwidths greater than 5 MHz and less than or equal to 8.33 MHz are expressed by the following relationships:

$$\begin{array}{ll} \text{Lower half of the band} & B_n = 12695.835 + 8.33n \quad \text{for } n = 1 \text{ to } 26 \\ \text{Upper half of the band} & B'_n = 12920.835 + 8.33n \quad \text{for } n = 1 \text{ to } 26 \end{array}$$

Where n is the channel number and B_n and B'_n are the centre frequencies in MHz of the paired channels. The 26 centre frequencies for the paired channels are summarised in Annex B, table B-2.

5.1.1.3 12.5 MHz bandwidth channels

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The centre frequencies of the 18 paired channels which allow RF channel bandwidths greater than 8.33 MHz and less than or equal to 12.5 MHz are expressed by the following relationships:

Lower half of the band	$C_n = 12693.75 + 12.5n$	for n = 1 to 18
Upper half of the band	$C'_n = 12918.75 + 12.5n$	for n = 1 to 18

Where n is the channel number and C_n and C'_n are the centre frequencies in MHz of the paired channels. The 18 centre frequencies for the paired RF channels are summarised in Annex B, table B-3.

5.1.1.4 25 MHz bandwidth channels

The centre frequencies of the 9 paired channels which allow RF channel bandwidths greater than 12.5 MHz and less than or equal to 25 MHz are expressed by the following relationships:

Lower half of the band	$D_n = 12687.5 + 25n$	for n = 1 to 9
Upper half of the band	$D'_n = 12912.5 + 25n$	for n = 1 to 9

Where n is the channel number and D_n and D'_n are the centre frequencies in MHz of the paired channels. The 9 centre frequencies for the paired RF channels are summarised in Annex B, table B-4.

5.1.1.5 50 MHz bandwidth channels

The centre frequencies of the 4 paired channels which allow RF channel bandwidths greater than 25 MHz and less than or equal to 50 MHz are expressed by the following relationships:

Lower half of the band	$E_n = 12675 + 50n$	for n = 1 to 4
Upper half of the band	$E'_n = 12900 + 50n$	for n = 1 to 4

Where n is the channel number and E_n and E'_n are the centre frequencies in MHz of the paired channels. The 4 centre frequencies for the paired RF channels are summarised in Annex B, table B-5.

ISED note for the RABC: the 13.15-13.2 GHz portion is not channelized. Feedback is sought from the RABC on considering the addition of channels for this portion of the band.

5.1.2 Branching or Spur Route Channels

The frequencies assigned to a main route system should be reused on the branching or spur routes where possible. The siting of repeater stations should be planned with this requirement in mind to ensure sufficient antenna discrimination at the branch-off angle.

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5.1.3 Closed Loop

When bidirectional point to point digital radio systems form a closed loop, such systems must be designed to consist of an even number of hops to permit the use of two frequency plans.

5.1.4 Assignment of Frequencies

New radio systems should normally use the lowest available frequency pair that can be successfully coordinated. However, due to varying conditions and circumstances across Canada, regional offices may assign frequencies using a procedure different from the one described above, at their own discretion.

Spectral Efficiency

The bidirectional point to point digital radio systems submitted for licensing shall meet a minimum spectral efficiency of 3.0 bits/s/Hz using single polarization.

In the case of systems using adaptive modulation to maintain link availability during deep fading conditions, the spectral efficiency level may be temporarily lowered for a short period of time, provided that the link is designed to meet the minimum spectral efficiency requirements specified above.

5.1.5 Protection Channels

(a) One paired protection channel may be permitted for systems with more than one paired working channel.

(b) Quad-path diversity² applications will be considered on a hop-by-hop basis to solve special propagation problems.

5.2 RF Channel Arrangements for Very High Capacity Microwave (VHCM) Systems

For VHCM systems employing digital modulation, the RF channel centre frequencies shall follow the channel plans for point-to-point radio systems described in section 5.1.1 of this standard. The spectral efficiency of digital VHCM systems shall meet spectral efficiency requirements of bidirectional point to point digital radio systems, as described in section 5.1.4 of this standard. Applicants are required to submit a detailed technical analysis to substantiate the number of and individual bandwidth of RF channels required for the VHCM system, including technical information on the CATV signals supported by the VHCM system.

VHCM systems employing analog modulation may be considered on a case-by-case basis at the discretion of the Department's regional office. Sufficient technical justification will be required to substantiate the use of such modulation techniques instead of a digital one. The RF channel arrangements for analog VHCM systems are described in Annex A, Table A-1.

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² Quad-path diversity refers to the use of frequency diversity and space diversity on the same path

5.3 RF Channel Arrangements for TV Pick-up Systems

5.3.1 RF Channel Arrangements

The channel plan defined in this standard provides for an RF channel bandwidth of 25 MHz.

5.3.2 RF Channel Centre Frequencies

There are four RF channels available in the band 13.15-13.25 GHz for TV Pick-up as follows:

Channel	Frequency
1	13.200 - 13.225 GHz
2	13.225 - 13.250 GHz
3	13.150 - 13.175 GHz
4	13.175 - 13.200 GHz

TV Pick-up users will share the channels allocated to this service. They will co-ordinate their use on an event basis.

TV Pick-up from mobile platforms (land, water or airborne) can be approved on the condition that such use is temporary and has been coordinated with other fixed service users in the affected geographic area.

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6. Transmitter Characteristics

6.1 Transmitter Characteristics for Point-to-Point Digital Radio Systems

The transmitter power delivered to the antenna input shall not exceed 10 watts (+10 dBW) per RF channel.

In the case of systems using automatic transmit power control (ATPC) to maintain link availability during deep fading conditions, the maximum transmitter power at the antenna port may be temporarily increased by a value corresponding to the ATPC range, up to a maximum 10 watts. In addition, the maximum e.i.r.p. limits indicated in Section 9 of this document shall be met at all times.

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The centre frequency of the emission shall be maintained within 0.005% of the assigned or reference frequency.

6.1.1 Emission Limits

- (a) In any 4 kHz band, where the centre frequency is removed from the assigned frequency by more than 50% up to and including 250% of the authorized bandwidth, the mean power of emission shall be attenuated below the mean output power of the transmitter in accordance with the following equation.

$$A = 35 + 0.8 (P - 50) + 10 \log_{10} B$$

where

- A = attenuation (in dB) below the mean output power level
P = percent removed from the centre frequency of the assigned RF channel
B = authorized bandwidth (in MHz)

- Note:** 1. In no case shall the attenuation be less than 50 dB.
2. Attenuation greater than 80 dB or to an absolute power of less than -13 dBm/MHz is not necessary.

- (b) In any 1 MHz band, where the centre frequency is removed from the assigned frequency by more than 250% of the authorized bandwidth the mean power of emission shall be attenuated by $43 + 10 \log_{10}$ (mean output power in watts) dB or 80 dB, whichever is the lesser attenuation.

6.2 Transmitter Characteristics for VHCM and TV Pick-up

The transmitter power delivered to the antenna input shall not exceed 10 watts (+10 dBW) per RF channel.

The centre frequency of the emission shall be maintained within 0.005% of the assigned or reference frequency.

All significant emissions from the transmitter, including at least 99% of the transmitted power, shall be contained within the authorized bandwidth.

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7. International Coordination

Stations operating in the band 12.7-13.25 GHz near the Canada-United States border are subject to the provisions of Arrangement A.

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8. Antenna Characteristics

8.1 [Antenna Characteristics for Bidirectional Point-to-Point Digital Radio Systems](#)

[The co-polarized radiation pattern envelope in the horizontal plane of the antenna must remain within envelope B shown in Figure 2 and Table 2, for both vertical and horizontal polarizations.](#)

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8.2 [Antenna Characteristics for VHCM Systems](#)

[The co-polarized radiation pattern envelope in the horizontal plane of the antenna must remain within envelope D shown in Figure 3 and Table 3, for both vertical and horizontal polarizations.](#)

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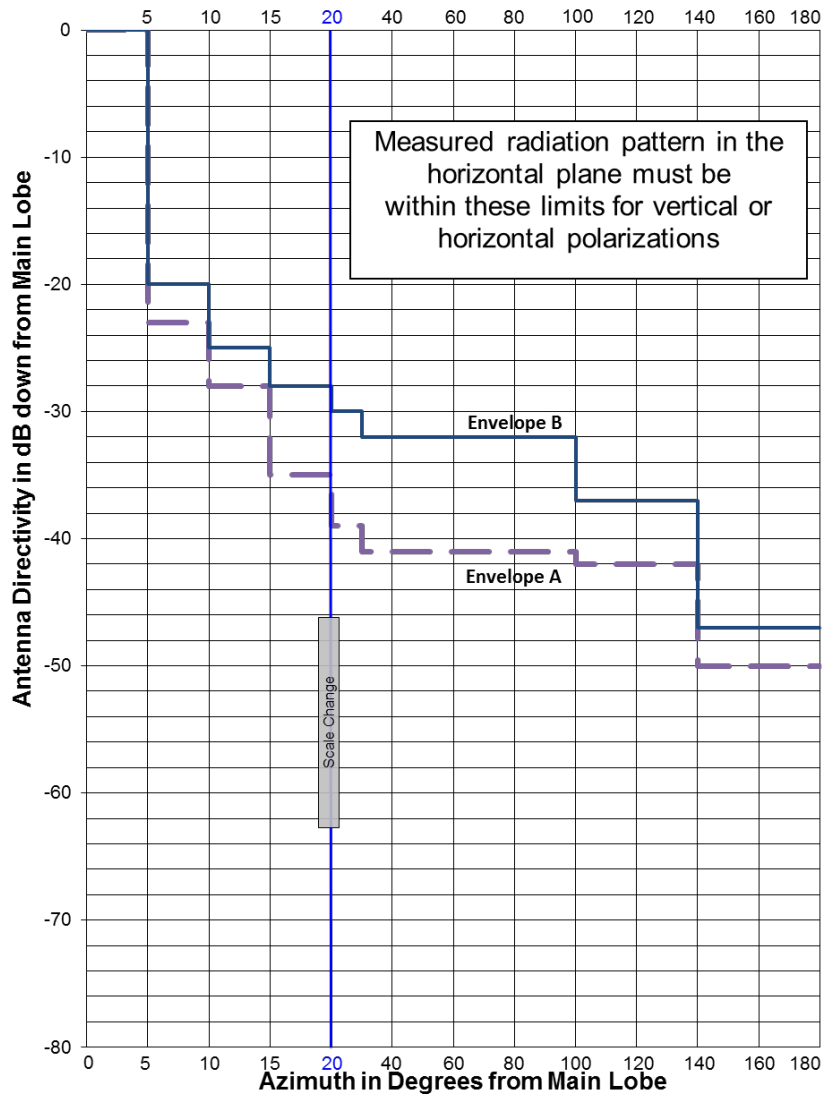
8.3 [Antenna Characteristics for TV Pick-up Systems](#)

[Fixed and transportable stations must employ directional antennas. The co-polarized radiation pattern envelope in the horizontal plane of the antenna must remain within envelope C shown in Figure 3 and Table 4, for both vertical and horizontal polarizations.](#)

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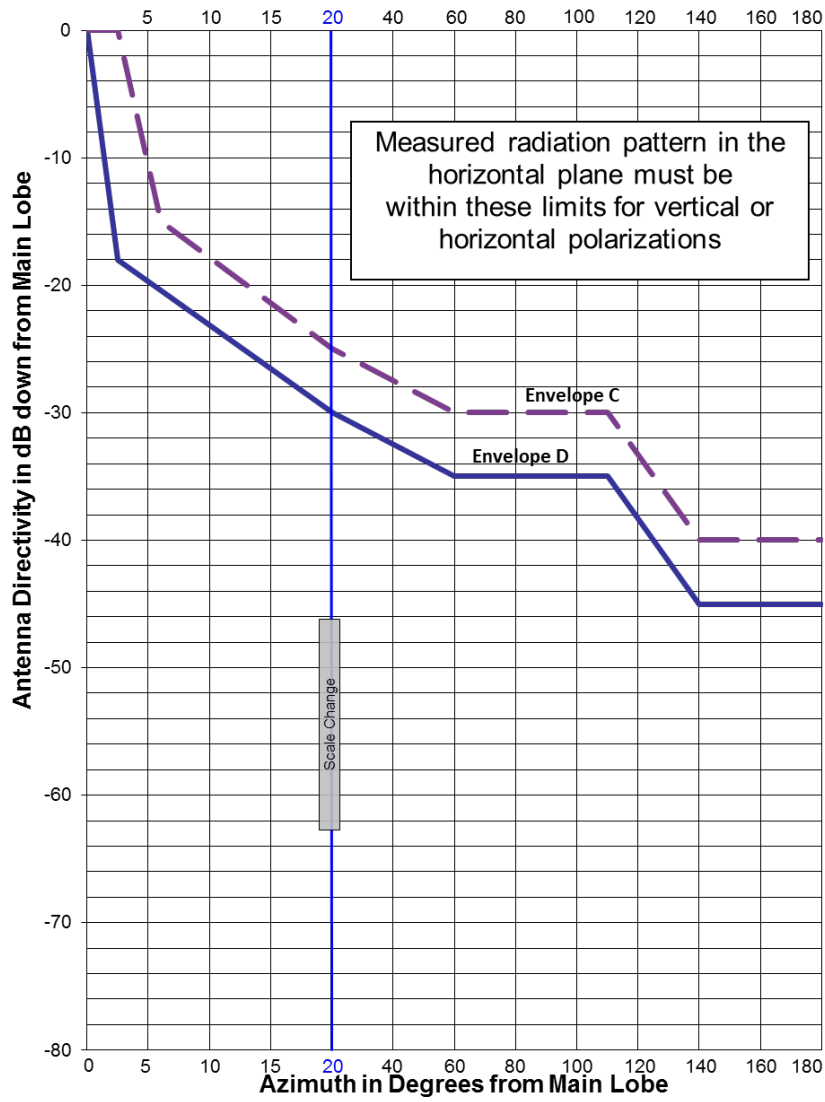
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**Figure 2 – Minimum Antenna Characteristics for Point-to-Point Digital Radio
Systems Operating in the Band 12.7-13.20 GHz**



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**Figure 3 – Minimum Antenna Characteristics for VHCM and TV Pick-up Radio
Systems Operating in the Band 12.7-13.25 GHz**



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Table 2: Minimum Antenna Characteristics for Bidirectional Point-to-Point Radio Systems Operating in the Band 12.7-13.20 GHz

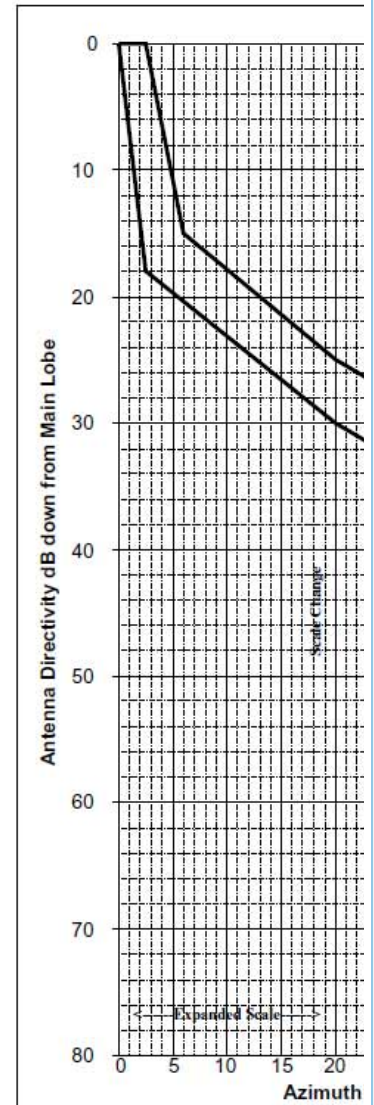
Azimuth in Degrees from Main Lobe Peak	Antenna Directivity Co-polarization (Decibels Down from Main Lobe Peak)	
	Envelope A	Envelope B
5° - 10°	23	20
10° - 15°	28	25
15° - 20°	35	28
20° - 30°	39	30
30° - 100°	41	32
100° - 140°	42	37
140° - 180°	50	47

Table 3: Minimum Antenna Characteristics for VHCM Systems Operating in the Band 12.7-13.2 GHz

Azimuth in Degrees from Main Lobe Peak	Antenna Directivity Co-polarization (Decibels Down from Main Lobe Peak)
2.5°	18
20°	30
60°	35
110°	35
140°	45
180°	45

Table 4: Minimum Antenna Characteristics for TV Pick-up Systems Operating in the Band 13.15-13.25 GHz

Azimuth in Degrees from Main Lobe Peak	Antenna Directivity Co-polarization (Decibels Down from Main Lobe Peak)
2.5°	0
6°	15
20°	25
60°	30



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110°	30
140°	40
180°	40

9. Maximum Equivalent Isotropically Radiated Power

The maximum equivalent isotropically radiated power (e.i.r.p.) from the antenna of a point-to-point radio transmitter shall not in any case exceed +50 dBW.

The maximum e.i.r.p. from the antenna of a VHCM transmitter shall not in any case exceed +55 dBW.

The maximum e.i.r.p. from the antenna of a TV Pick-up transmitter shall not in any case exceed +45 dBW.

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10. Enhanced Technical Standards for Moderately Congested and Highly Congested Areas

For new radio systems being deployed in moderately congested or highly congested areas, the co-polarized radiation pattern envelope in the horizontal plane of the antenna must remain within envelope A shown in Figure 2 and Table 2, for both vertical and horizontal polarizations.

Protection channels for radio systems operating in congested areas are not permitted. For channels requirements in uncongested areas, see Section 5.1.5 of this document.

Systems submitted for licensing shall have a minimum spectral efficiency of 4.4 bits/s/Hz within the RF channel bandwidth on a single polarization.

11. Avoidance of the Geostationary Satellite Orbit

As far as practicable, sites for transmitting terrestrial stations, in the fixed service, employing maximum values of e.i.r.p. exceeding +45 dBW in the frequency band 12.7-13.25 GHz, should be selected so that the direction of maximum radiation of any antenna will be at least 1.5° away from the geostationary-satellite orbit, taking into account the effect of atmospheric refraction.

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Annex A : Channel Arrangement Requirements for VHCM Systems Employing Analog Modulation

A. Frequency Plan

A.1 Amplitude Modulated VHCM

Amplitude modulated VHCM systems shall use channels spaced at 6 MHz (see [Figures A-1 and A-2](#)), corresponding to VHF television channelling on cable systems in accordance with [ICES-008](#).

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A.2 Frequency Modulated VHCM

Frequency modulated VHCM systems shall use two interleaved series of channels, F1 and F2, each having a channel spacing of 25 MHz (see [Table A-1](#)). The two series may be combined in a single facility, using orthogonal polarization between them for separation, providing a capacity of forty channels, or they may be used by separate facilities in the same area with a capacity of twenty channels each. Licensed bandwidth will be 12.5 MHz per R.F. Channel.

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A.3 In large metropolitan areas where frequency congestion in this band is likely, the establishment of amplitude modulated and frequency modulated systems may be restricted to one or the other at the discretion of the Regional Director according to the local situation.

A.4 Normally, multipoint systems will use amplitude modulation and multihop point to point systems will use frequency modulation.

Figure A-1 – Channel Arrangement for Amplitude Modulated VHCM (40 Channel Systems)

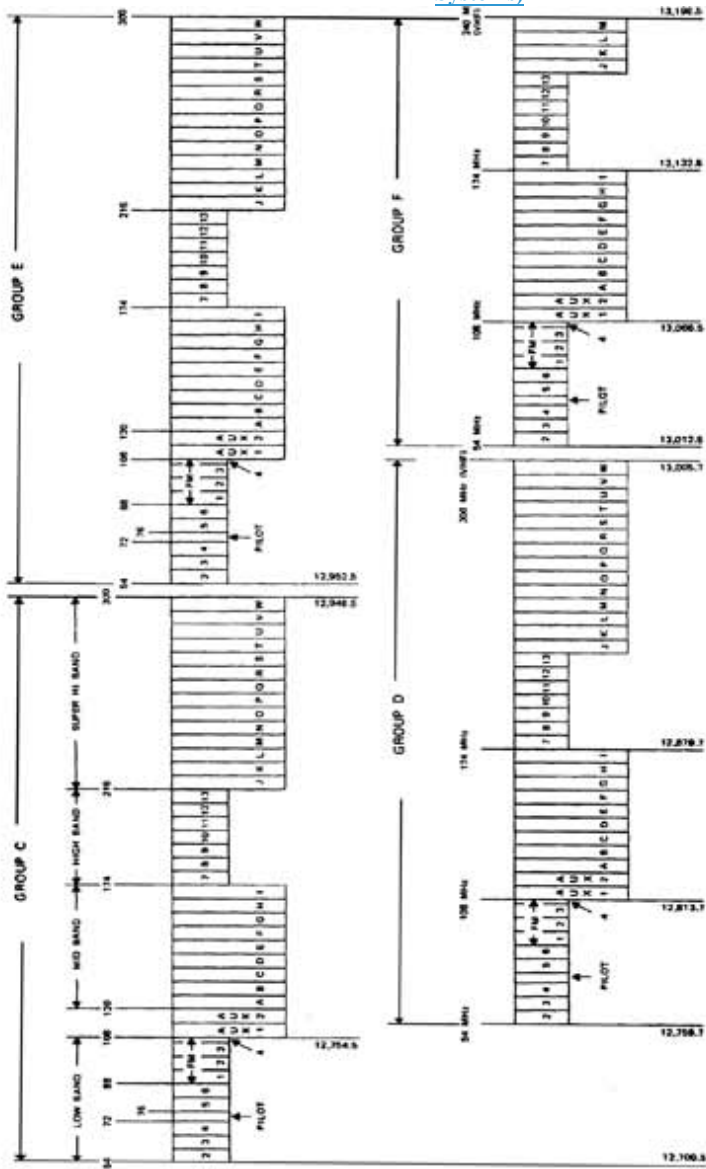


Figure A-2 – Channel Arrangement for Amplitude Modulated VHCM (40 Channel Systems)

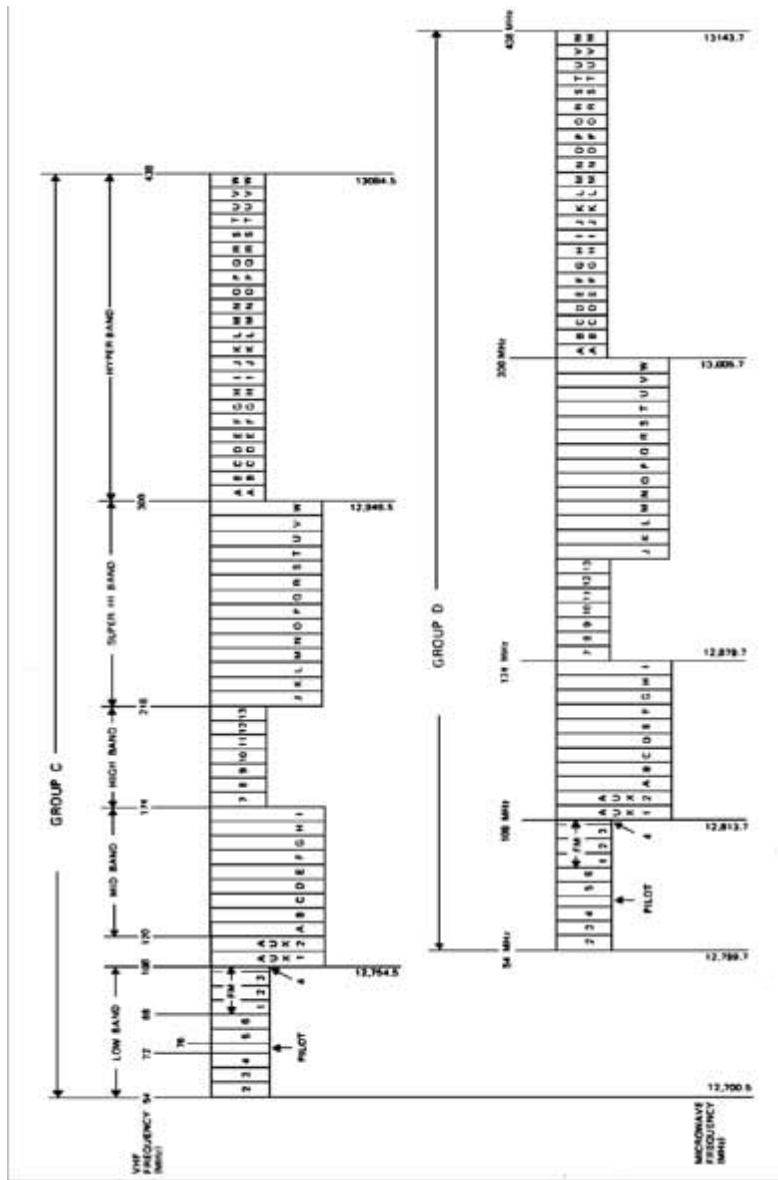


Table A-1 – Channel Arrangement for Frequency Modulated VHCM

Channel	F1	F2
1	12 706.25	
2		12 718.75
3	12 731.25	
4		12 743.75
5	12 756.25	
6		12 768.75
7	12 781.25	
8		12 793.75
9	12 806.25	
10		12 818.75
11	12 831.25	
12		12 843.75
13	12 856.25	
14		12 868.75
15	12 881.25	
16		12 893.75
17	12 906.25	
18		12 918.75
19	12 931.25	
20		12 943.75
21	12 956.25	
22		12 968.75
23	12 981.25	
24		12 993.75
25	13 006.25	
26		13 018.75
27	13 031.25	
28		13 043.75
29	13 056.25	
30		13 068.75
31	13 081.25	
32		13 093.75
33	13 106.25	
34		13 118.75
35	13 131.25	
36		13 143.75
37	13 156.25	

38		13 168.75
39	13 181.25	
40		13 193.75

Annex B: Channel Arrangements for Point-to-Point Radio Systems

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B. Channel Arrangement Centre Frequencies for Point-to-Point Radio Systems

Table B-1 Centre Frequencies for 5 MHz channel spacings

<u>Channel</u>	<u>Lower Channel Centre Frequency (MHz)</u>	<u>Upper Channel Centre Frequency (MHz)</u>
<u>A1/A1'</u>	<u>12702.5</u>	<u>12927.5</u>
<u>A2/A2'</u>	<u>12707.5</u>	<u>12932.5</u>
<u>A3/A3'</u>	<u>12712.5</u>	<u>12937.5</u>
<u>A4/A4'</u>	<u>12717.5</u>	<u>12942.5</u>
<u>A5/A5'</u>	<u>12722.5</u>	<u>12947.5</u>
<u>A6/A6'</u>	<u>12727.5</u>	<u>12952.5</u>
<u>A7/A7'</u>	<u>12732.5</u>	<u>12957.5</u>
<u>A8/A8'</u>	<u>12737.5</u>	<u>12962.5</u>
<u>A9/A9'</u>	<u>12742.5</u>	<u>12967.5</u>
<u>A10/A10'</u>	<u>12747.5</u>	<u>12972.5</u>
<u>A11/A11'</u>	<u>12752.5</u>	<u>12977.5</u>
<u>A12/A12'</u>	<u>12757.5</u>	<u>12982.5</u>
<u>A13/A13'</u>	<u>12762.5</u>	<u>12987.5</u>
<u>A14/A14'</u>	<u>12767.5</u>	<u>12992.5</u>
<u>A15/A15'</u>	<u>12772.5</u>	<u>12997.5</u>
<u>A16/A16'</u>	<u>12777.5</u>	<u>13002.5</u>
<u>A17/A17'</u>	<u>12782.5</u>	<u>13007.5</u>
<u>A18/A18'</u>	<u>12787.5</u>	<u>13012.5</u>
<u>A19/A19'</u>	<u>12792.5</u>	<u>13017.5</u>
<u>A20/A20'</u>	<u>12797.5</u>	<u>13022.5</u>
<u>A21/A21'</u>	<u>12802.5</u>	<u>13027.5</u>
<u>A22/A22'</u>	<u>12807.5</u>	<u>13032.5</u>
<u>A23/A23'</u>	<u>12812.5</u>	<u>13037.5</u>
<u>A24/A24'</u>	<u>12817.5</u>	<u>13042.5</u>

<u>A25/A25'</u>	<u>12822.5</u>	<u>13047.5</u>
<u>A26/A26'</u>	<u>12827.5</u>	<u>13052.5</u>
<u>A27/A27'</u>	<u>12832.5</u>	<u>13057.5</u>
<u>A28/A28'</u>	<u>12837.5</u>	<u>13062.5</u>
<u>A29/A29'</u>	<u>12842.5</u>	<u>13067.5</u>
<u>A30/A30'</u>	<u>12847.5</u>	<u>13072.5</u>
<u>A31/A31'</u>	<u>12852.5</u>	<u>13077.5</u>
<u>A32/A32'</u>	<u>12857.5</u>	<u>13082.5</u>
<u>A33/A33'</u>	<u>12862.5</u>	<u>13087.5</u>
<u>A34/A34'</u>	<u>12867.5</u>	<u>13092.5</u>
<u>A35/A35'</u>	<u>12872.5</u>	<u>13097.5</u>
<u>A36/A36'</u>	<u>12877.5</u>	<u>13102.5</u>
<u>A37/A37'</u>	<u>12882.5</u>	<u>13107.5</u>
<u>A38/A38'</u>	<u>12887.5</u>	<u>13112.5</u>
<u>A39/A39'</u>	<u>12892.5</u>	<u>13117.5</u>
<u>A40/A40'</u>	<u>12897.5</u>	<u>13122.5</u>
<u>A41/A41'</u>	<u>12902.5</u>	<u>13127.5</u>
<u>A42/A42'</u>	<u>12907.5</u>	<u>13132.5</u>
<u>A43/A43'</u>	<u>12912.5</u>	<u>13137.5</u>
<u>A44/A44'</u>	<u>12917.5</u>	<u>13142.5</u>
<u>A45/A45'</u>	<u>12922.5</u>	<u>13147.5</u>

Table B-2 Centre Frequencies for 8.33 MHz channel spacings

<u>Channel</u>	<u>Lower Channel Centre Frequency (MHz)</u>	<u>Upper Channel Centre Frequency (MHz)</u>
B1/B1'	12704.165	12929.165
B2/B2'	12712.495	12937.495
B3/B3'	12720.825	12945.825
B4/B4'	12729.155	12954.155
B5/B5'	12737.485	12962.485
B6/B6'	12745.815	12970.815
B7/B7'	12754.145	12979.145
B8/B8'	12762.475	12987.475
B9/B9'	12770.805	12995.805
B10/B10'	12779.135	13004.135
B11/B11'	12787.465	13012.465
B12/B12'	12795.795	13020.795
B13/B13'	12804.125	13029.125
B14/B14'	12812.455	13037.455
B15/B15'	12820.785	13045.785
B16/B16'	12829.115	13054.115
B17/B17'	12837.445	13062.445
B18/B18'	12845.775	13070.775
B19/B19'	12854.105	13079.105
B20/B20'	12862.435	13087.435
B21/B21'	12870.765	13095.765
B22/B22'	12879.095	13104.095
B23/B23'	12887.425	13112.425
B24/B24'	12895.755	13120.755
B25/B25'	12904.085	13129.085
B26/B26'	12912.415	13137.415

Table B-3 Centre Frequencies for 12.5 MHz channel spacings

<u>Channel</u>	<u>Lower Channel Centre Frequency (MHz)</u>	<u>Upper Channel Centre Frequency (MHz)</u>
<u>C1/C1'</u>	<u>12706.25</u>	<u>12931.25</u>
<u>C2/C2'</u>	<u>12718.75</u>	<u>12943.75</u>
<u>C3/C3'</u>	<u>12731.25</u>	<u>12956.25</u>
<u>C4/C4'</u>	<u>12743.75</u>	<u>12968.75</u>
<u>C5/C5'</u>	<u>12756.25</u>	<u>12981.25</u>
<u>C6/C6'</u>	<u>12768.75</u>	<u>12993.75</u>
<u>C7/C7'</u>	<u>12781.25</u>	<u>13006.25</u>
<u>C8/C8'</u>	<u>12793.75</u>	<u>13018.75</u>
<u>C9/C9'</u>	<u>12806.25</u>	<u>13031.25</u>
<u>C10/C10'</u>	<u>12818.75</u>	<u>13043.75</u>
<u>C11/C11'</u>	<u>12831.25</u>	<u>13056.25</u>
<u>C12/C12'</u>	<u>12843.75</u>	<u>13068.75</u>
<u>C13/C13'</u>	<u>12856.25</u>	<u>13081.25</u>
<u>C14/C14'</u>	<u>12868.75</u>	<u>13093.75</u>
<u>C15/C15'</u>	<u>12881.25</u>	<u>13106.25</u>
<u>C16/C16'</u>	<u>12893.75</u>	<u>13118.75</u>
<u>C17/C17'</u>	<u>12906.25</u>	<u>13131.25</u>
<u>C18/C18'</u>	<u>12918.75</u>	<u>13143.75</u>

Table B-4 Centre Frequencies for 25 MHz channel spacings

<u>Channel</u>	<u>Lower Channel Centre Frequency (MHz)</u>	<u>Upper Channel Centre Frequency (MHz)</u>
D1/D1'	<u>12712.5</u>	<u>12937.5</u>
D2/D2'	<u>12737.5</u>	<u>12962.5</u>
D3/D3'	<u>12762.5</u>	<u>12987.5</u>
D4/D4'	<u>12787.5</u>	<u>13012.5</u>
D5/D5'	<u>12812.5</u>	<u>13037.5</u>
D6/D6'	<u>12837.5</u>	<u>13062.5</u>
D7/D7'	<u>12862.5</u>	<u>13087.5</u>
D8/D8'	<u>12887.5</u>	<u>13112.5</u>
D9/D9'	<u>12912.5</u>	<u>13137.5</u>

Table B-5 Centre Frequencies for 50 MHz channel spacings

<u>Channel</u>	<u>Lower Channel Centre Frequency (MHz)</u>	<u>Upper Channel Centre Frequency (MHz)</u>
E1/E1'	<u>12725</u>	<u>12950</u>
E2/E2'	<u>12775</u>	<u>13000</u>
E3/E3'	<u>12825</u>	<u>13050</u>
E4/E4'	<u>12875</u>	<u>13100</u>

Annex C: Areas for Implementation of Geographical Sharing between Point-to-Point, TV Pick-up and VHCM Systems

Table C-1 lists medium and large population centres with population greater than 30,000, as reported by the Statistics Canada 2016 Census Program. The boundary files for population centres can be downloaded from the Statistics Canada website³.

The precise application of geographical sharing requirements outlined in this SRSP, specifically near and around population centres listed in Table C-1, shall be made at the discretion of the Department's regional office, on a case-by-case basis.

³ <https://www12.statcan.gc.ca/census-recensement/2011/geo/bound-limit/bound-limit-2016-eng.cfm>

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Table C-1: Listing of medium and large population centres

No.	ID	NAME	Province
1	792	St. John's	Newfoundland and Labrador / Terre-Neuve-et-Labrador
2	159	Charlottetown	Prince Edward Island / Île-du-Prince-Édouard
3	348	Halifax	Nova Scotia / Nouvelle-Écosse
4	240	Drummondville	Quebec / Québec
5	328	Granby	Quebec / Québec
6	305	Fredericton	New Brunswick / Nouveau-Brunswick
7	539	Moncton	New Brunswick / Nouveau-Brunswick
8	734	Saint John	New Brunswick / Nouveau-Brunswick
9	176	Chicoutimi - Jonquière	Quebec / Québec
10	63	Beloeil	Quebec / Québec
11	396	Joliette	Quebec / Québec
12	685	Québec	Quebec / Québec
13	547	Montréal	Quebec / Québec
14	616	Ottawa - Gatineau	Quebec / Québec
15	834	Saint-Hyacinthe	Quebec / Québec
16	836	Saint-Jean-sur-Richelieu	Quebec / Québec
17	842	Saint-Jérôme	Quebec / Québec
18	709	Rimouski	Quebec / Québec
19	750	Shawinigan	Quebec / Québec
20	758	Sherbrooke	Quebec / Québec
21	770	Sorel	Quebec / Québec
22	953	Trois-Rivières	Quebec / Québec
23	971	Salaberry-de-Valleyfield	Quebec / Québec
24	987	Victoriaville	Quebec / Québec
25	1177	Châteauguay	Quebec / Québec
26	87	Bowmanville	Ontario
27	314	Georgetown	Ontario
28	92	Brantford	Ontario
29	43	Barrie	Ontario
30	61	Belleville	Ontario
31	480	London	Ontario
32	167	Chatham	Ontario
33	205	Cornwall	Ontario
34	463	Leamington	Ontario
35	788	St. Catharines - Niagara Falls	Ontario
36	799	St. Thomas	Ontario
37	897	Stratford	Ontario

38	532	Milton	Ontario
39	343	Guelph	Ontario
40	349	Hamilton	Ontario
41	399	Kanata	Ontario
42	415	Kingston	Ontario
43	419	Kitchener	Ontario
44	595	North Bay	Ontario
45	609	Orangeville	Ontario
46	610	Orillia	Ontario
47	904	Sudbury	Ontario
48	935	Thunder Bay	Ontario
49	614	Oshawa	Ontario
50	616	Ottawa - Gatineau	Ontario
51	636	Peterborough	Ontario
52	737	Sarnia	Ontario
53	739	Sault Ste. Marie	Ontario
54	1020	Stouffville	Ontario
55	1032	Windsor	Ontario
56	1039	Woodstock	Ontario
57	944	Toronto	Ontario
58	678	Prince Albert	Saskatchewan
59	698	Regina	Saskatchewan
60	3	Airdrie	Alberta
61	115	Calgary	Alberta
62	694	Red Deer	Alberta
63	119	Campbell River	British Columbia / Colombie-Britannique
64	177	Chilliwack	British Columbia / Colombie-Britannique
65	207	Courtenay	British Columbia / Colombie-Britannique
66	478	Lloydminster	Alberta
67	568	Nanaimo	British Columbia / Colombie-Britannique
68	292	Fort McMurray	Alberta
69	549	Moose Jaw	Saskatchewan
70	397	Kamloops	British Columbia / Colombie-Britannique
71	403	Kelowna	British Columbia / Colombie-Britannique
72	478	Lloydminster	Saskatchewan
73	780	Spruce Grove	Alberta
74	738	Saskatoon	Saskatchewan
75	1528	Welland - Pelham	Ontario
76	983	Vernon	British Columbia / Colombie-Britannique
77	984	Victoria	British Columbia / Colombie-Britannique
78	1021	White Rock	British Columbia / Colombie-Britannique

79	1048	Abbotsford	British Columbia / Colombie-Britannique
80	467	Lethbridge	Alberta
81	1560	Mission	British Columbia / Colombie-Britannique
82	91	Brandon	Manitoba
83	1036	Winnipeg	Manitoba
84	252	Edmonton	Alberta
85	523	Medicine Hat	Alberta
86	336	Grande Prairie	Alberta
87	632	Penticton	British Columbia / Colombie-Britannique
88	679	Prince George	British Columbia / Colombie-Britannique
89	973	Vancouver	British Columbia / Colombie-Britannique

The Department may require independent facilities operating in the same or adjacent areas to use orthogonal antenna polarizations. In large metropolitan areas where a high demand for use of this band is expected, the Department may require changes in antennas, transmit or receive locations, transmitter power levels, filters, and/or operating procedures to ensure efficient use of spectrum.

- 3.1.2 Spectrum Utilization Policy 312.7 (SP 312.7) - "Spectrum Utilization Policy for the Fixed Service and the Fixed-Satellite Service in the Band 12.7-13.25 GHz".
- 3.1.4 Broadcast Procedure 23 - "Technical Standards and Procedures for Broadcasting Receiving Undertakings (Cable Television)".
- 3.2 The above documents are available on request from the Department of Industry headquarters in Ottawa or from regional offices of the Department located in Vancouver, Winnipeg, Toronto, Montreal or Moncton.

The smoothed directivity pattern in the horizontal plane of the antenna for both the E and H fields with vertical and horizontal polarization must remain within envelope shown in Figure 1:

Envelope (a) for TV Pick-up

Envelope (b) for VHCM

Issued under the authority of the
Minister of Communications

S.N. Ahmed
Director General
Engineering Programs

