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SRSP-310.7  
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Spectrum Management and Telecommunications

Standard Radio System Plan

# **Technical Requirements for Fixed Line-of-Sight Radio Systems Operating in the Band 10.7-11.7 GHz**

## Preface

Issue 3 of SRSP-310.7 has been released to incorporate policy changes announced in *Canada Gazette* notice DGTP-013-09, *Decision Regarding Spectrum Utilization Policy for the 11 GHz Band*. This SRSP replaces SRSP-310.7, Issue 2.

The following are the main changes:

1. Until January 1, 2026, Industry Canada will not license any new fixed service systems in the band 11.075-11.2 GHz or the band 11.575-11.7 GHz, subject to the provisions in *Canada Gazette* notice DGTP-013-09.
2. Several other editorial updates and corrections have been made.

Issued under the authority of  
the Minister of Industry

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## 1. Intent

- 1.1 This Standard Radio System Plan (SRSP) states the minimum technical requirements for the efficient use of the frequency band 10.7-11.7 GHz by medium capacity (MC) and high capacity (HC)<sup>1</sup> point-to-point, digital line-of-sight radio systems in the fixed service. Until January 1, 2026, Industry Canada will not license any new fixed service systems in the band 11.075-11.2 GHz or the band 11.575-11.7 GHz, subject to the provisions in *Canada Gazette* notice DGTP-013-09, *Decision Regarding Spectrum Utilization Policy for the 11 GHz Band*.
- 1.2 This SRSP is intended to be employed in the design and specification of radio systems and equipment, as well as in the evaluation of technical 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*.
- 1.3 This SRSP specifies equipment characteristics related 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 This standard replaces SRSP-310.7, Issue 2. Further revisions to this SRSP will be made as required.
- 2.2 Existing point-to-point radio systems operating in the band 10.7-11.7 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 Industry Canada on a case-by-case basis. New systems deployed in this band must conform to the requirements of this standard.
- 2.3 Radio systems that conform to these technical requirements will be given licensing priority over non-standard radio systems operating in this band.
- 2.4 The arrangements for non-standard systems are outlined in SP Gen, *General Information Related to Spectrum Utilization and Radio Systems Policies*.
- 2.5 The Geographical Differences Policy (GDP) guideline applies to this frequency band. Additional information on the GDP can be found in SP 1-20 GHz.<sup>2</sup>

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<sup>1</sup> Spectrum Utilization Policy SP 1-20 GHz, *Revisions to Microwave Spectrum Utilization Policies in the Range of 1-20 GHz*, January 1995, describes technical criteria defining fixed system capacities. This information will be incorporated into a revision of SP Gen.

<sup>2</sup> Spectrum Utilization Policy SP 1-20 GHz, *Revisions to Microwave Spectrum Utilization Policies in the Range of 1-20 GHz*, January 1995, contains spectrum utilization principles, including the Geographical Differences Policy guideline. This information will be incorporated into a revision of SP Gen.

- 2.6 Even though a radio system complies with the requirements of this SRSP, modifications may be required to the system whenever harmful interference<sup>3</sup> is caused.
- 2.7 When potential conflict between radio systems cannot be resolved by the parties concerned, Industry Canada should be advised. After consultation with these parties, the Department will determine the necessary modifications and schedule of modifications to resolve the conflict.
- 2.8 Industry Canada may require licensees and/or applicants to use receiver selectivity characteristics that provide rejection of harmful interference.
- 2.9 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.
- 2.10 It should be noted that the terrestrial fixed service shares this band with other services in accordance with the *Canadian Table of Frequency Allocations 9 kHz to 275 GHz*.

### 3. Related Documents

The current issues of the following documents are applicable and available on Industry Canada's [Spectrum Management and Telecommunications](http://www.ic.gc.ca/spectrum) website at <http://www.ic.gc.ca/spectrum>.

DGTP-013-09	<i>Decision Regarding Spectrum Utilization Policy for the 11 GHz Band</i>
DGTP-003-08	<i>Consultation on the Possible Use of the Extended-Ku Spectrum Bands for Direct-to-Home (DTH) Satellite Broadcasting Services</i>
DGTP-001-02	<i>Consultation on Revisions to the Spectrum Utilization Policies in the 3-30 GHz Frequency Range</i>
SP Gen	<i>General Information Related to Spectrum Utilization and Radio Systems Policies</i>
SP 1-20 GHz	<i>Revisions to Microwave Spectrum Utilization Policies in the Range of 1-20 GHz</i>
SP 3-30 GHz	<i>Revisions to Spectrum Utilization Policies in the 3-30 GHz Frequency Range and Further Consultation</i>
RSP-113	<i>Application Procedures for Planned Radio Stations Above 960 MHz in the Fixed Service</i>

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<sup>3</sup> 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 radiocommunication service operating in accordance with regulations and technical requirements laid down by Industry Canada under the *Radiocommunication Act*.

TRC-43	<i>Designation of Emissions (Including Necessary Bandwidth and Classification), Class of Station and Nature of Service</i>
CPC-2-0-03	<i>Radiocommunication and Broadcasting Antenna Systems</i>

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

#### 4. Radio Frequency (RF) Channel Arrangement Description

The following channel arrangements are consistent with *Canada Gazette* notice DGTP-013-09. Systems in the band segments 11.075-11.2 GHz and 11.575-11.7 GHz authorized prior to January 1, 2010, may continue to operate under the terms of their current authorization. Modifications will be considered on a case-by-case basis. For reference, the previous channel arrangements from SRSP-310.7, Issue 2, can be found in Annex A.

##### 4.1 RF Channel Arrangements for MC and HC Radio Systems

The channel plans defined in this standard provide for four RF channel bandwidths. Channel pairs are provided with a common transmit/receive separation of 490 MHz.

The allowable channel bandwidths are:

- Less than or equal to 10 MHz
- Greater than 10 MHz and less than or equal to 20 MHz
- Greater than 20 MHz and less than or equal to 30 MHz
- Greater than 30 MHz and less than or equal to 40 MHz

4.1.1 The centre frequencies of the 36 paired channels that allow RF channel bandwidths of 10 MHz or less are expressed by the following relationships:

Lower half of the band	$A_n = 10705 + 10n$	for $n = 1$ to 36
Upper half of the band	$A'_n = 11195 + 10n$	for $n = 1$ to 36

where  $n$  is the channel number and  $A_n$  and  $A'_n$  are the centre frequencies (in MHz) of the paired channels.

**Note:** Additional channel assignments at 10705 MHz may be employed for one-way operation.

- 4.1.2 The centre frequencies of the 18 paired channels that allow RF channel bandwidths of greater than 10 MHz and less than or equal to 20 MHz are expressed by the following relationships:

$$\begin{array}{lll} \text{Lower half of the band} & B_n = 10700 + 20n & \text{for } n = 1 \text{ to } 18 \\ \text{Upper half of the band} & B'_n = 11190 + 20n & \text{for } n = 1 \text{ to } 18 \end{array}$$

where  $n$  is the channel number and  $B_n$  and  $B'_n$  are the centre frequencies (in MHz) of the paired channels.

- 4.1.3 The centre frequencies of the 12 paired channels that allow RF channel bandwidths of greater than 20 MHz and less than or equal to 30 MHz are expressed by the following relationships:

$$\begin{array}{lll} \text{Lower half of the band} & C_n = 10695 + 30n & \text{for } n = 1 \text{ to } 12 \\ \text{Upper half of the band} & C'_n = 11185 + 30n & \text{for } n = 1 \text{ to } 12 \end{array}$$

where  $n$  is the channel number and  $C_n$  and  $C'_n$  are the centre frequencies (in MHz) of the paired channels.

- 4.1.4 The centre frequencies of the 9 paired channels that allow RF channel bandwidths of greater than 30 MHz and less than or equal to 40 MHz are expressed by the following relationships:

$$\begin{array}{lll} \text{Lower half of the band} & D_n = 10695 + 40n & \text{for } n = 1 \text{ to } 9 \\ \text{Upper half of the band} & D'_n = 11185 + 40n & \text{for } n = 1 \text{ to } 9 \end{array}$$

where  $n$  is the channel number and  $D_n$  and  $D'_n$  are the centre frequencies (in MHz) of the paired channels.

## 4.2 Branching and Spur Route Channels

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

## 4.3 Closed Loop

Systems must be designed so that any closed loop will consist of an even number of hops.

## 4.4 Growth Patterns

New MC and HC 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, at their discretion, assign frequencies using a procedure that is different from the one described above.

#### 4.5 Spectral Efficiency

MC and HC digital systems submitted for licensing shall have a minimum spectral efficiency of 3.0 bits/s/Hz within the RF channel bandwidth on a single polarization.

#### 4.6 Protection Channels

- 4.6.1 One protection channel is normally permitted for HC systems with more than one working channel.
- 4.6.2 For single channel systems, protection channels are normally not permitted. However, quad-path diversity<sup>4</sup> applications will be considered on a case-by-case basis to solve special propagation problems.

### 5. Transmitter Characteristics

- 5.1 The transmitter power delivered to the antenna input per RF channel shall not exceed the following limit for each bandwidth:

**Table 1: Transmitter Power Limits**

Bandwidth (MHz)	Power Limits	
	(watts)	(dBW)
40	10.0	+10.0
30	10.0	+10.0
20	7.5	+8.7
10	7.5	+8.7

- 5.2 The transmitted frequency shall be maintained within  $\pm 0.003\%$  of the assigned frequency.

#### 5.3 Digital Transmission Spectrum Control

- 5.3.1 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:

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<sup>4</sup> “Quad-path diversity” refers to the use of frequency diversity and space diversity on the same path.



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

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)

**Notes:** 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.

5.3.2 In any 4 kHz 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. Antenna Characteristics

6.1 The co-polarized radiation pattern envelope in the horizontal plane of the antenna must remain within envelope B shown in Figure 1 and Table 3 for both vertical and horizontal polarizations.

6.2 The antenna shall have a minimum front-to-back ratio of 49 dB.

## 7. Maximum Equivalent Isotropically Radiated Power (e.i.r.p.)

7.1 The maximum e.i.r.p. from the antenna must not, in any case, exceed +55 dBW per RF channel.

7.2 As far as practicable, sites for transmitting terrestrial stations that operate in the fixed service and employ a maximum e.i.r.p. that exceeds +45 dBW in the frequency band 10.7-11.7 GHz should be selected so that the direction of maximum radiation of the antenna will be pointing at least  $1.5^\circ$  away from the geostationary-satellite orbit, taking into account the effect of atmospheric refraction.

## 8. Enhanced Technical Standards for Moderately Congested and Highly Congested Areas

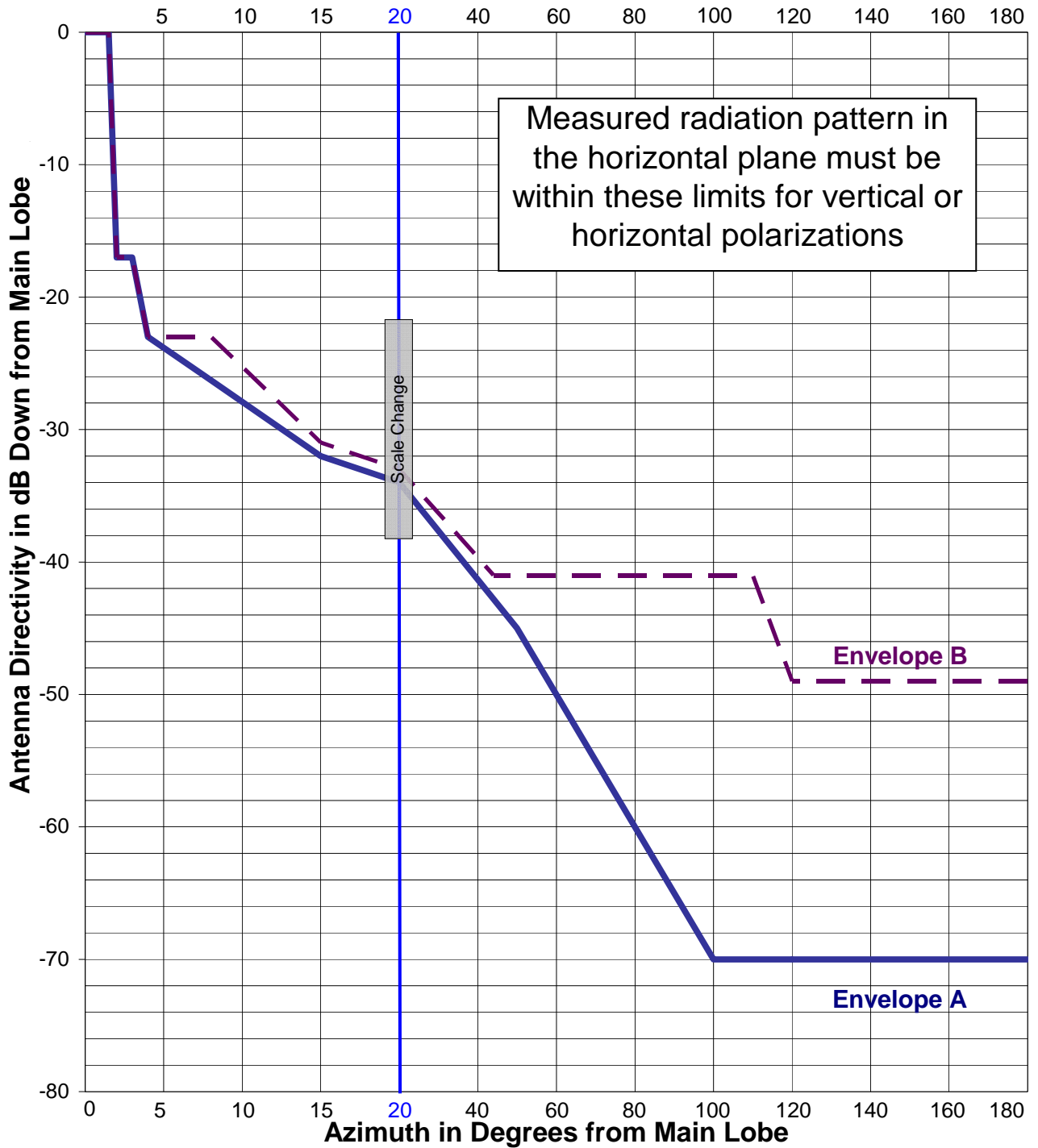
8.1 The co-polarized radiation pattern envelope in the horizontal plane of the antenna must remain within envelope A shown in Figure 1 and Table 2 for both vertical and horizontal polarizations.

8.2 The antenna shall have a minimum front-to-back ratio of 70 dB.

8.3 MC and HC digital 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.

- 8.4 Radio systems employing 20 MHz, 30 MHz or 40 MHz channel plans must have adequate filtering such that RF emission and reception bandwidth characteristics allow the operation of separate systems on adjacent channels using orthogonal polarization when the undesired and the desired signals are of the same magnitude at the input of the receive antenna.

**Figure 1: Minimum Antenna Characteristics for the Band 10.7-11.7 GHz**



**Table 2: Minimum Antenna Characteristics for the Band 10.7-11.7 GHz – Envelope A**

<b>Azimuth in Degrees from Main Lobe</b>	<b>Antenna Directivity in dB Down from Main Lobe</b>
1.5°	0
2°	17
3°	17
4°	23
15°	32
20°	34
50°	45
100°	70
180°	70

**Table 3: Minimum Antenna Characteristics for the Band 10.7-11.7 GHz – Envelope B**

<b>Azimuth in Degrees from Main Lobe</b>	<b>Antenna Directivity in dB Down from Main Lobe</b>
1.5°	0
2°	17
3°	17
4°	23
8°	23
15°	31
20°	33
44°	41
110°	41
120°	49
180°	49

## Annex A

This information has been extracted from SRSP-310.7, Issue 2, for reference only.

### 4.2 RF Channel Arrangements for LC Radio Systems

This section provides radio frequency (RF) channel arrangements with a common transmit/receive separation of 490 MHz for the development of low-capacity (LC) radio systems.

- 4.2.1 The centre frequencies of the 64 paired channels that allow RF channel bandwidths of 1.25 MHz or less are expressed by the following relationships:

$$\begin{array}{ll} \text{Lower half of the band, } E_n = 11114.375 + 1.25n & \text{for } n = 1 \text{ to } 64 \\ \text{Upper half of the band, } E'_n = 11604.375 + 1.25n & \text{for } n = 1 \text{ to } 64 \end{array}$$

where  $n$  is the channel number, and  $E_n$  and  $E'_n$  are the centre frequencies (in MHz) of the paired channels.

- 4.2.2 The centre frequencies of the 32 paired channels that allow RF channel bandwidths of greater than 1.25 MHz and less than or equal to 2.5 MHz are expressed by the following relationships:

$$\begin{array}{ll} \text{Lower half of the band, } F_n = 11113.75 + 2.5n & \text{for } n = 1 \text{ to } 32 \\ \text{Upper half of the band, } F'_n = 11603.75 + 2.5n & \text{for } n = 1 \text{ to } 32 \end{array}$$

where  $n$  is the channel number, and  $F_n$  and  $F'_n$  are the centre frequencies (in MHz) of the paired channels.

- 4.2.3 The centre frequencies of the 21 paired channels that allow RF channel bandwidths of greater than 2.5 MHz and less than or equal to 3.75 MHz are expressed by the following relationships:

$$\begin{array}{ll} \text{Lower half of the band, } G_n = 11113.125 + 3.75n & \text{for } n = 1 \text{ to } 21 \\ \text{Upper half of the band, } G'_n = 11603.125 + 3.75n & \text{for } n = 1 \text{ to } 21 \end{array}$$

where  $n$  is the channel number, and  $G_n$  and  $G'_n$  are the centre frequencies (in MHz) of the paired channels.

- 4.2.4 The centre frequencies of the 16 paired channels that allow RF channel bandwidths of greater than 3.75 MHz and less than or equal to 5 MHz are expressed by the following relationships:

Lower half of the band,  $H_n = 11112.5 + 5n$  for  $n = 1$  to  $16$   
Upper half of the band,  $H'_n = 11602.5 + 5n$  for  $n = 1$  to  $16$

where  $n$  is the channel number, and  $H_n$  and  $H'_n$  are the centre frequencies (in MHz) of the paired channels.