Industry Canada Industrie Canada

SRSP-506
Issue 2
October 1999

Spectrum Management and Telecommunications Policy

Standard Radio System Plan

Technical Requirements for Land Mobile and Fixed Radio Services Operating in the Bands 896-901 MHz and 935-940 MHz

Canada

Aussi disponible en français - PHRH-506

Table of Contents

Page

1. Intent

1.1 This Standard Radio System Plan (SRSP) states the minimum technical requirements for the purpose of efficient spectrum utilization for land mobile and fixed point-to-point systems operating in the bands 896-901 and 935-940 MHz.

1.2 Radio systems conforming to the requirements contained in this SRSP will take priority in licensing and coordination over non-standard systems proposed for operation in these bands.

Systems, which employ spectrally efficient technologies[1], are strongly encouraged and may also be authorized on a standard basis.

1.3 The arrangements for non-standard systems are outlined in Spectrum Utilization Policies SP Gen (SP Gen), *General Information Related to Spectrum Utilization and Radio Systems Policies.*

2. General

2.1 Equipment used for land mobile or fixed systems operating in the above bands must comply with appropriate Technical Standards listed in Para. 3.1. A TAC (Technical Acceptance Certificate) is required for the equipment if the applied Radio Standards Specification appears on the Category 1 Equipment List.

2.2 Although a radio system conforms to the requirements of this SRSP, the Department may require modifications to the system whenever harmful interference[2] is caused to other radio sites or systems, except when such interference is due to inadequate receiver selectivity as dealt with under 2.3 below.

2.3 The Department reserves the right to limit protection to licensed radio receivers only to the extent of bandwidth of the transmitters whose emissions they are licensed to receive. Licensees and/or applicants should use receiver selectivity characteristics or filters that provide rejection of harmful interference.

2.4 Systems that employ a base station as an automatic repeater station shall transmit on frequencies identified as base transmit frequencies. Dispatcher stations (often referred

---

[1] Different channelization from what is described herein may be considered if it results in increased spectrum efficiency.

[2] **Harmful Interference** means an adverse effect of electromagnetic energy from any emission, radiation or induction that (a) endangers the use or functioning of a safety-related radiocommunication system, or (b) significantly degrades or obstructs, or repeatedly interrupts, the use or functioning of radio apparatus or radio-sensitive equipment.

to as control stations) operating through an automatic repeater station shall transmit on frequencies identified as mobile transmit frequencies.

2.5 Single frequency operation utilizing the base/repeater transmit frequency (known as repeater talk-around) beyond the service area of a paired frequency system may be permitted on a case-by-case basis as an adjunct to the paired frequency system. Some channels have also been designated for talk-around use (see Section 4.5). Such operation may be permitted within the authorized service area at the discretion of the system operator and will be on a non-protection, non-interference basis to the other users of the system in the case of radio service provided by a radiocommunication service provider.

2.6 Very low capacity (VLC) fixed systems may be authorized in these bands on a non-standard basis beyond 120 km of the centre of the metropolitan areas listed in Annex B and should be in accordance with applicable technical provisions of Standard Radio System Plan 507 (SRSP-507).

3. Related Documents

3.1 The current issues of the following documents are applicable:

3.1.1 **Standard Radio System Plan 507 (SRSP-507):** Technical Requirements for Line-of-Sight Radio Systems Operating in the Fixed Service in the Bands 932.5-935 MHz and 941.5-944 MHz.
http://strategis.ic.gc.ca/SSG/sf00055e.html

3.1.2 **Radio Standards Procedure 100 (RSP-100):** Radio Equipment Certification Procedures.
http://strategis.ic.gc.ca/SSG/sf01130e.html

3.1.3 **Radio Standards Procedure 101 (RSP-101):** Application Procedure for Planned Radio Stations Operating on Frequencies below 960 MHz.
http://strategis.ic.gc.ca/SSG/sf00023e.html

3.1.4 **Radio Standards Specification 119 (RSS-119):** Land Mobile and Fixed Radio Transmitters and Receivers, 27.41 to 960 MHz.
http://strategis.ic.gc.ca/SSG/sf01063e.html

3.1.5 **Radio Systems Policy 003 (RP-003):** Policy Guidelines for Mobile Radio Trunked Systems.
http://strategis.ic.gc.ca/SSG/sf01058e.html

3.1.6 **Spectrum Utilization Policies SP Gen (SP Gen):** General Information Related to Spectrum Utilization and Radio Systems Policies.
http://strategis.ic.gc.ca/SSG/sf01049e.html

3.1.7 **Spectrum Utilization Policy SP-896 MHz (SP-896 MHz):** Spectrum Utilization Policy for the Fixed, Mobile, Radiolocation and Amateur Services in the Band 896-960 MHz.
http://strategis.ic.gc.ca/SSG/sf01054e.html

3.1.8 **Radio Systems Policy RP-Gen (RP-Gen)**: General Spectrum Policy Principles and Other Information Related to Spectrum Utilization and Radio System Policies.
http://strategis.ic.gc.ca/SSG/sf01056e.html

3.1.9 **Radiocommunication Regulations:** The new Radiocommunication Regulations replace the General Radio Regulations, Parts I and II, the Interference Causing Equipment Regulations and the Radio Operator Regulations. They provide for the necessary regulatory framework in which to manage the radio frequency spectrum.
http://strategis.ic.gc.ca/SSG/sf01265e.html

3.1.10 **Terrestrial Radiocommunication Agreements and Arrangements**
http://strategis.ic.gc.ca/SSG/sf01361e.html

4. Band Plan

4.1 Sharing Arrangements Along the Canada/United States Border

In the interest of equitable sharing of spectrum along the border and to reduce coordination and administrative effort and time, the governments of Canada and the United States have entered into arrangements whereby certain portions of the bands 896-901 MHz and 935-940 MHz are set aside on a block allocation basis for the unrestricted geographic use of either country in border areas. The terms of these arrangements take into account the demographic differences that exist along the border between the two countries. Protection and sharing zones are illustrated in Annex C Figure 1. The bands 896-901 MHz and 935-940 MHz are shared on a block allotment basis within the sharing zones and the entire bands are available for assignment within the protection zones. There are however, certain power and height restrictions applicable within both the sharing and protection zones.

4.1.1 Special Conditions for the Use of Certain Frequencies

Frequencies primarily allotted for unrestricted use by the United States may be assigned in Canada for use within the sharing zones under the following conditions:

(a) The predicted maximum power flux density (PFD) of the signal at the border, calculated using free space propagation (taking into account any antenna discrimination in the direction of the border), does not exceed the limits specified in Annex C Tables C1 and C2.

(b) In Sharing Zone II, in recognition of special topographical conditions, the use of a point-to-point propagation model is permitted; in which case the limit for the predicted maximum PFD shall be -107 dBW/m^2, at or beyond the border.

(c) In all three sharing zones, assignments for these stations are subject to the condition that in the event the actual signals exceed -107 dBW/m^2 at or beyond the border, the licensee will take immediate action to eliminate any interference.

(d) Assignments on these frequencies will not be entitled to protection from U.S. stations.

4.2 Channelling Plan for the 896-901 MHz and 935-940 MHz Bands

A channelling plan is outlined below, including provision for national/wide-area and special systems. The geographic availability for these bands is illustrated in Annex A Figure 1. The channel designation is given in Annex A Table 1, a detailed channelling plan is given in Annex A Table 2 (a) and (b).

4.2.1 The normal channel spacing for this spectrum is 12.5 kHz and assignments begin 12.5 kHz from the band edge. However channel spacings which are whole multiples of 12.5 kHz (25 kHz, 50 kHz, etc.) will be considered on a case-by-case basis, taking local considerations and spectrum efficiency into account. The spacing between associated mobile and base station frequencies is 39 MHz. The detailed channel designation is given in Table 1.

4.2.2 The spectrum in the bands 896-901 MHz and 935-940 MHz is channelized into two 5 channel subgroups yielding 10 channel groups. Within a given 10 channel group, the separation between channels is 12.5 kHz, forming a spectrum block of 125 kHz maximum. The spectrum is channelized in this fashion to permit either trunking or other spectrum efficient technologies to be used.

4.2.3 The distribution of the contiguous channels for any one licensed system within the geographical area to be served may range from one site to many. In those cases where multiple sites are employed, and where the channels are re-used within the area being served, the subset of channels used at any one site may or may not be contiguous.

4.2.4 The following paired channels are to be available for the implementation of an Advanced Train Control System (ATCS):

935.8875 / 896.8875 MHz
935.9375 / 896.9375 MHz
935.9875 / 896.9875 MHz
936.8875 / 897.8875 MHz
936.9375 / 897.9375 MHz
936.9875 / 897.9875 MHz

The details of the use of these frequencies for ATCS in border areas will be worked out between the two appropriate operating Agencies: the Association of American Railways (AAR) in the United States and the Railway Association of Canada (RAC) in Canada. Within the sharing zones, any non-ATCS usage will require coordination with ATCS usage in both countries. Outside the sharing zones, a similar coordination with the RAC will be required for non-ATCS usage along railway rights-of-ways. These frequencies may be used for non-ATCS applications in areas distant from railway rights-of-way, at the discretion of the Regional Executive Director.

4.3 Channeling plan

In accordance with RP-003, an applicant for a trunked radio system is usually assigned up to five (5) pairs of channels at a time. However, where an application is made for other than 5 pairs of channels to be used on multiple sites, the application will be considered, subject to adequate justification being provided. Minimum loading of the existing channels, in accordance with Section 5.2 will be a condition for system expansion.

The spectrum availability is illustrated in Annex A Figure 1. Assignments will be made starting with the lowest available block and proceeding numerically upward, unless proper justification is provided and the spectrum availability otherwise permits. Assignments for conventional (i.e., non-trunked) systems can be made from the available spectrum in a given area.

4.4 National and/or Wide Area Radio Systems

A national land mobile frequency assignment will be considered if the operational function satisfies the following requirements: (1) operational necessity for the mobile and/or portable radio equipment to travel and be used on a regular basis, normally within all regions of the country, **AND** operational necessity for the mobile and/or portable radio equipment to operate on the same frequency(ies) at all operating locations **OR** (2) to provide response to unpredictable emergencies of national geographic scope and concern.

A "wide-area" land mobile radio system is a system that has common frequencies assigned for use under the following conditions:

(a) operational necessity for the land mobile/portable radio equipment to travel and be used on a regular basis between two or more geographic areas (a geographic area is defined as the coverage area obtained from a base station in accordance with its effective radiated power (ERP) and effective antenna height);
and

(b) operational necessity for the land mobile/portable equipment to operate on the same frequency(ies) at all operating locations.

The specific channel groups available for both systems are outlined in Table 2(a).

4.5 Other Designated Channels

The channels designated below are available for test, demonstration and talk-around use. These channels will be licensed on a shared no protection basis.

399	Between 81°W and 85°W	within sharing and
396, 397	East of 71°W/West of 85°W	protection zones
396, 397, 398, 399	otherwise	

5. Channel Sharing and Loading Guidelines

5.1 Channel Sharing

Section 40 of the *Radiocommunication Regulations* states: "The assignment of a frequency or frequencies to a holder of a radio authorization does not confer a monopoly on the use of the frequency or frequencies, nor shall a radio authorization be construed as conferring any right of continued tenure in respect of the frequency or frequencies".

5.2 Loading Guidelines

The Department is currently revising its loading guidelines. Until such time as the new guidelines will be issued, the Department will continue to apply the following guidelines in determining adequate loading of communications channels, and thus, of radio channels.

5.2.1 Mobiles per channel

For the purpose of designating the loading guidelines, users will be divided into two major categories: safety services and other applicants. Noting that trunked usage is to provide more efficient use of the spectrum than conventional usage, the basic loading guidelines in terms of number of mobiles per communication channel for radio systems follow:

User Category	Radio System Type	Mobiles per Communication Channel
safety services	conventional	30
	trunked	50
others	conventional	75
	trunked	90

5.2.2 Traffic model

Another approach that may be applied by the Department in some locations, is based on traffic theory and makes use of the Erlang C model. This model assumes that the system will queue a certain number of blocked calls.

The Grade of Service will be defined by a specified delay, in message lengths, such that calls delayed will not exceed the specified delay with a probability **P(t) of 0.03 (3%).** That is, 97% of the calls placed will not be delayed by greater than the specified delay.

For Safety Services, the specified delay is **1** average message length
For Other Services, the specified delay is **3** average message lengths

The average length is defined by the average Push to Talk (PTT) duration.

5.2.3 Other considerations

The Department recognizes that the above approaches may not be appropriate for all systems and networks. The Department will give consideration to technologies, changing user behavior or pattern, introduction of new services, systems, and network deployment as a whole when assessing frequency requirements.

These guidelines are to be interpreted as minimum levels, recognizing that they represent a broad average over many different services with different message characteristics. In the frequency assignment process, these guidelines will be utilized in conjunction with current observed channel occupancy data (obtained with automatic occupancy measuring equipment) to determine whether additional mobiles may be added to a channel or whether additional channels are required. Such observations will also be used to assess the general loading criteria and the inherent trade-off between sound spectrum management and acceptable grades of service.

RP-003 provides a detailed description of the policy governing the implementation of trunked systems.

6. Technical criteria

6.1 Radiated power and antenna heights limits

Effective radiated power (ERP) shall be limited to that necessary to provide the required service as governed by the system requirements and will be subject to the limitations stipulated in Annex C Tables A1 and A2.

6.2 Co-channel separation

Only co-channel interference between base stations will be taken into consideration. Normally, the geographic separation between co-channel systems will be calculated based on a non-overlap of the 40 dBµV/m service contour of the existing station and the 22 dBµV/m interference contour of the proposed station.

The service contour of the existing station is usually calculated based on probability of service of 50 % of the time for 90% of the locations at edge of contour.

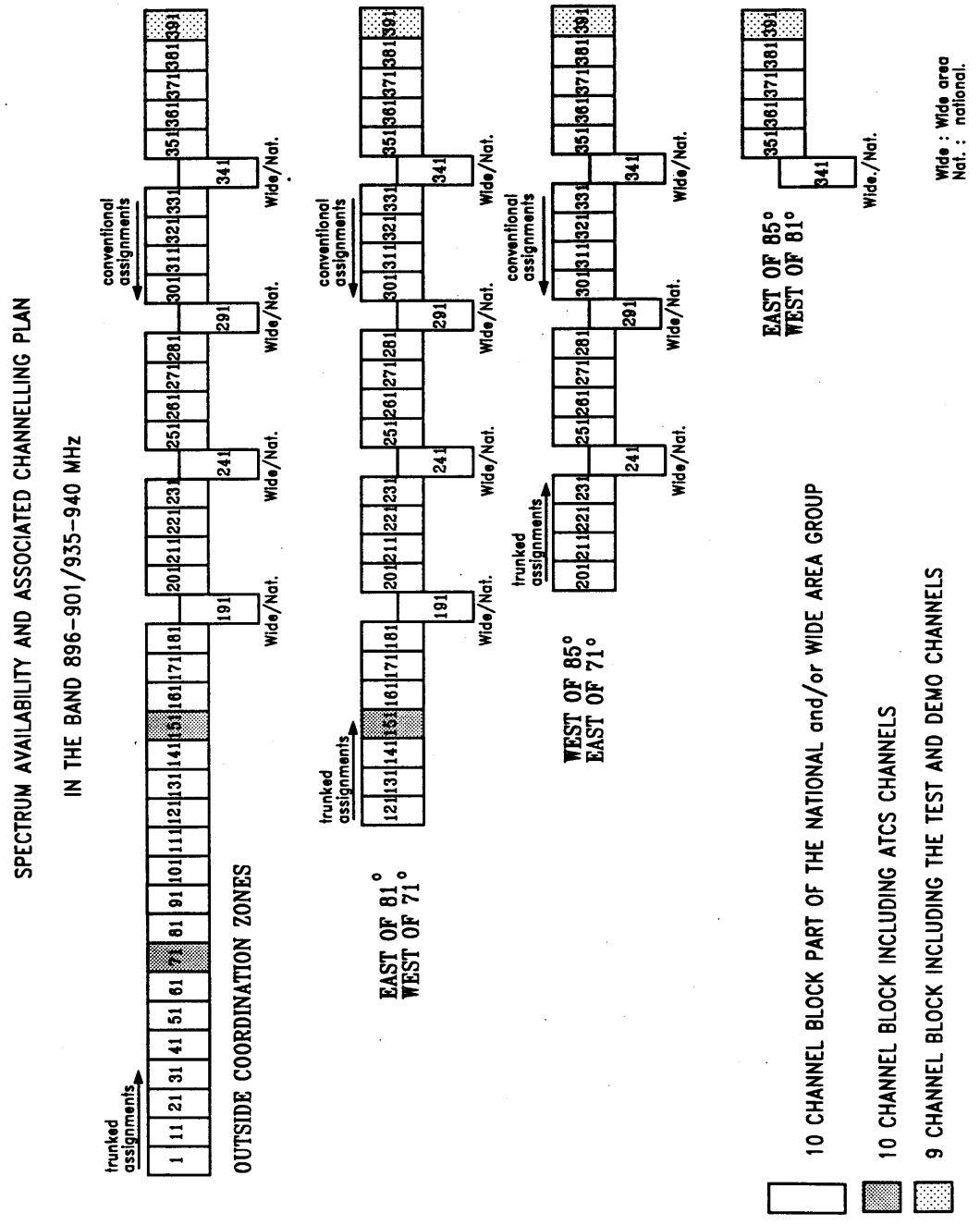
The interference contour is calculated using the probability that the signal level used is not exceeded more than 10% of the time, i.e. 90% of the time the signal is below the threshold, for 90% of the locations.

Issued under the authority of the
Minister of Industry

R.W. McCaughern
Director General
Spectrum Engineering

Annex A

Figure 1



Annex A

Table 1: Channel Designation

Note: Only the base transmit frequencies are listed; mobile transmit frequencies are 39 MHz lower.

Channel No.	Base transmit frequency	Channel No.	Base transmit frequency	Channel No.	Base transmit frequency
1	935.0125	41	935.5125	81	936.0125
2	.0250	42	.5250	82	.0250
3	.0375	43	.5375	83	.0375
4	.0500	44	.5500	84	.0500
5	.0625	45	.5625	85	.0625
6	.0750	46	.5750	86	.0750
7	.0875	47	.5875	87	.0875
8	935.1000	48	935.6000	88	936.1000
9	.1125	49	.6125	89	.1125
10	.1250	50	.6250	90	.1250
11	.1375	51	.6375	91	.1375
12	.1500	52	.6500	92	.1500
13	.1625	53	.6625	93	.1625
14	.1750	54	.6750	94	.1750
15	.1875	55	.6875	95	.1875
16	935.2000	56	935.7000	96	936.2000
17	.2125	57	.7125	97	.2125
18	.2250	58	.7250	98	.2250
19	.2375	59	.7375	99	.2375
20	.2500	60	.7500	100	.2500
21	.2625	61	.7625	101	.2625
22	.2750	62	.7750	102	.2750
23	.2875	63	.7875	103	.2875
24	935.3000	64	935.8000	104	936.3000
25	.3125	65	.8125	105	.3125
26	.3250	66	.8250	106	.3250
27	.3375	67	.8375	107	.3375
28	.3500	68	.8500	108	.3500
29	.3625	69	.8625	109	.3625
30	.3750	70	.8750	110	.3750
31	.3875	71	.8875	111	.3875
32	935.4000	72	935.9000	112	936.4000
33	.4125	73	.9125	113	.4125
34	.4250	74	.9250	114	.4250
35	.4375	75	.9375	115	.4375
36	.4500	76	.9500	116	.4500
37	.4625	77	.9625	117	.4625
38	.4750	78	.9750	118	.4750
39	.4875	79	.9875	119	.4875
40	935.5000	80	936.0000	120	936.5000

Channel No.	Base transmit frequency	Channel No.	Base transmit frequency	Channel No.	Base transmit frequency
121	936.5125	161	937.0125	201	937.5125
122	.5250	162	.0250	202	.5250
123	.5375	163	.0375	203	.5375
124	.5500	164	.0500	204	.5500
125	.5625	165	.0625	205	.5625
126	.5750	166	.0750	206	.5750
127	.5875	167	.0875	207	.5875
128	936.6000	168	937.1000	208	937.6000
129	.6125	169	.1125	209	.6125
130	.6250	170	.1250	210	.6250
131	.6375	171	.1375	211	.6375
132	.6500	172	.1500	212	.6500
133	.6625	173	.1625	213	.6625
134	.6750	174	.1750	214	.6750
135	.6875	175	.1875	215	.6875
136	936.7000	176	937.2000	216	937.7000
137	.7125	177	.2125	217	.7125
138	.7250	178	.2250	218	.7250
139	.7375	179	.2375	219	.7375
140	.7500	180	.2500	220	.7500
141	.7625	181	.2625	221	.7625
142	.7750	182	.2750	222	.7750
143	.7875	183	.2875	223	.7875
144	936.8000	184	937.3000	224	937.8000
145	.8125	185	.3125	225	.8125
146	.8250	186	.3250	226	.8250
147	.8375	187	.3375	227	.8375
148	.8500	188	.3500	228	.8500
149	.8625	189	.3625	229	.8625
150	.8750	190	.3750	230	.8750
151	.8875	191	.3875	231	.8875
152	936.9000	192	937.4000	232	937.9000
153	.9125	193	.4125	233	.9125
154	.9250	194	.4250	234	.9250
155	.9375	195	.4375	235	.9375
156	.9500	196	.4500	236	.9500
157	.9625	197	.4625	237	.9625
158	.9750	198	.4750	238	.9750
159	.9875	199	.4875	239	.9875
160	937.0000	200	937.5000	240	938.0000

Channel No.	Base transmit frequency
241	938.0125
242	.0250
243	.0375
244	.0500
245	.0625
246	.0750
247	.0875
248	938.1000
249	.1125
250	.1250
251	.1375
252	.1500
253	.1625
254	.1750
255	.1875
256	938.2000
257	.2125
258	.2250
259	.2375
260	.2500
261	.2625
262	.2750
263	.2875
264	938.3000
265	.3125
266	.3250
267	.3375
268	.3500
269	.3625
270	.3750
271	.3875
272	938.4000
273	.4125
274	.4250
275	.4375
276	.4500
277	.4625
278	.4750
279	.4875
280	938.5000
281	938.5125
282	.5250
283	.5375
284	.5500
285	.5625
286	.5750
287	.5875
288	938.6000
289	.6125
290	.6250
291	.6375
292	.6500
293	.6625
294	.6750
295	.6875
296	938.7000
297	.7125
298	.7250
299	.7375
300	.7500
301	.7625
302	.7750
303	.7875
304	938.8000
305	.8125
306	.8250
307	.8375
308	.8500
309	.8625
310	.8750
311	.8875
312	938.9000
313	.9125
314	.9250
315	.9375
316	.9500
317	.9625
318	.9750
319	.9875
320	939.0000
321	939.0125
322	.0250
323	.0375
324	.0500
325	.0625
326	.0750
327	.0875
328	939.1000
329	.1125
330	.1250
331	.1375
332	.1500
333	.1625
334	.1750
335	.1875
336	939.2000
337	.2125
338	.2250
339	.2375
340	.2500
341	.2625
342	.2750
343	.2875
344	939.3000
345	.3125
346	.3250
347	.3375
348	.3500
349	.3625
350	.3750
351	.3875
352	939.4000
353	.4125
354	.4250
355	.4375
356	.4500
357	.4625
358	.4750
359	.4875
360	939.5000

Channel No.	Base transmit frequency
361	939.5125
362	.5250
363	.5375
364	.5500
365	.5625
366	.5750
367	.5875
368	939.6000
369	.6125
370	.6250
371	.6375
372	.6500
373	.6625
374	.6750
375	.6875
376	939.7000
377	.7125
378	.7250
379	.7375
380	.7500
381	.7625
382	.7750
383	.7875
384	939.8000
385	.8125
386	.8250
387	.8375
388	.8500
389	.8625
390	.8750
391	.8875
392	939.9000
393	.9125
394	.9250
395	.9375
396	.9500
397	.9625
398	.9750
399	939.9875

Annex A

Table 2 (a): Channelling Plan

1. General

In the Canada/United States sharing zones, the following channels are available for use in Canada:

Area	Channels
Between 71°W and 81°W	121 to 399
Between 81°W and 85°W	341 to 399
East of 71°W and West of 85 °W	201 to 397

Outside the Canada/United States sharing zones, channels 1 to 399 are available for use in Canada.

2. National and/or Wide Area Assignments

Channel groups 191, 241, 291 and 341 are available for national/wide area radio systems. These channel groups consists of the following channels:

group 191: 191,192,193,194,195,196,197,198,199 and 200
group 241: 241,242,243,244,245,246,247,248,249 and 250
group 291: 291,292,293,294,295,296,297,298,299 and 300
group 341: 341,342,343,344,345,346,347,348,349 and 350

Annex A

Table 2 (b): Group Channelling

Note: The group number is given by the first channel of the group. The designation "a" or "b" corresponds to the 2 sub-groups of 5 channels within the group of 10 contiguous channels. For trunked systems, frequencies are assigned in groups of 5 channels according to this table, starting with the sub-group (a) and expansion in sub-group (b).

	S)))))Q (a) S)))))Q	S)))))Q (b) S)))))Q
1	1, 2, 3, 4, 5	6, 7, 8, 9, 10
11	11, 12, 13, 14, 15	16, 17, 18, 19, 20
21	21, 22, 23, 24, 25	26, 27, 28, 29, 30
31	31, 32, 33, 34, 35	36, 37, 38, 39, 40
41	41, 42, 43, 44, 45	46, 47, 48, 49, 50
51	51, 52, 53, 54, 55	56, 57, 58, 59, 60
61	61, 62, 63, 64, 65	66, 67, 68, 69, 70
71	71, 72, 73, 74, 75	76, 77, 78, 79, 80
81	81, 82, 83, 84, 85	86, 87, 88, 89, 90
91	91, 92, 93, 94, 95	96, 97, 98, 99,100
101	101,102,103,104,105	106,107,108,109,110
111	111,112,113,114,115	116,117,118,119,120
121	121,122,123,124,125	126,127,128,129,130
131	131,132,133,134,135	136,137,138,139,140
141	141,142,143,144,145	146,147,148,149,150
151	151,152,153,154,155	156,157,158,159,160
161	161,162,163,164,165	166,167,168,169,170
171	171,172,173,174,175	176,177,178,179,180
181	181,182,183,184,185	186,187,188,189,190
191	191,192,193,194,195	196,197,198,199,200
201	201,202,203,204,205	206,207,208,209,210
211	211,212,213,214,215	216,217,218,219,220
221	221,222,223,224,225	226,227,228,229,230
231	231,232,233,234,235	236,237,238,239,240
241	241,242,243,244,245	246,247,248,249,250
251	251,252,253,254,255	256,257,258,259,260
261	261,262,263,264,265	266,267,268,269,270
271	271,272,273,274,275	276,277,278,279,280
281	281,282,283,284,285	286,287,288,289,290
291	291,292,293,294,295	296,297,298,299,300
301	301,302,303,304,305	306,307,108,109,310
311	311,312,313,314,315	316,317,318,319,320
321	321,322,323,324,325	326,327,328,329,330
331	331,332,333,334,335	336,337,338,339,340

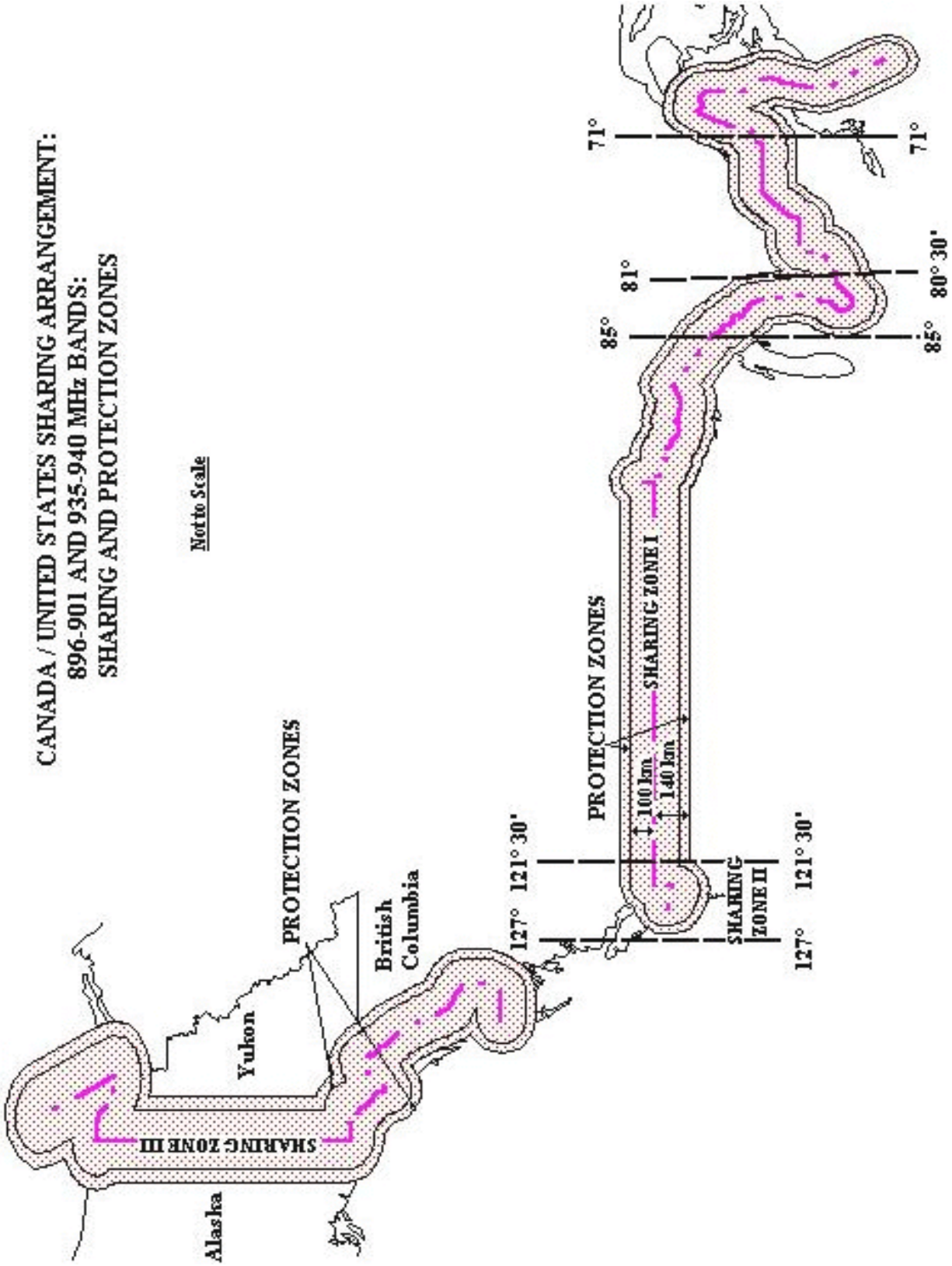
341	341,342,343,344,345	346,347,348,349,350
351	351,352,353,354,355	356,357,358,359,360
361	361,362,363,364,365	366,367,368,369,370
371	371,372,373,374,375	376,377,378,379,380
381	381,382,383,384,385	386,387,388,389,390
391	391,392,393,394,395	396,397,398,399

Annex B

Item	Metropolitan Area
1	Calgary, Alta.
2	Chicoutimi-Jonquière, Que.
3	Edmonton, Alta.
4	Halifax, N. S.
5	Hamilton, Ont.
6	Kitchener, Ont.
7	London, Ont.
8	Montreal, Que.
9	Oshawa, Ont.
10	Ottawa-Hull, Ont., Que.
11	Quebec, Que.
12	Regina, Sask.
13	Saint John, N.B.
14	Saskatoon, Sask.
15	St. Catharines-Niagara, Ont.
16	St. John's, Nlfd.
17	Sherbrooke, Que.
18	Sudbury, Ont.
19	Thunder Bay, Ont.
20	Toronto, Ont.
21	Vancouver, B.C.
22	Victoria, B.C.
23	Windsor, Ont.
24	Winnipeg, Man.

Annex C

Figure 1: Map



Annex C

1. General

1.1 The text and tables of Annex C reflect the annex of the applicable Canada/United States arrangement. Table numbering differs from the rest of this document for easier reference to the original text of the arrangement.

2. Limits of Effective Radiated Power and Antenna Height

2.1 Effective Radiated Power (ERP) is defined as the product of the power supplied to the antenna and its gain relative to a half-wave dipole in a given direction.

2.2 For base stations in the Protection Zones and Sharing Zones I and III, Table A1 lists the limits of Effective Radiated Power (ERP) corresponding to the Effective Antenna Height (EAH) ranges shown. In this case, Effective Antenna Height is calculated by subtracting the Assumed Average Terrain Elevation given in Table A3 from the Antenna Height Above Mean Sea Level.

Table A1

Effective Antenna Height (EAH)		ERP
Meters	**Feet**	**Watts (Maximum)**
0 - 152	0 - 500	500
153 - 305	501 - 1000	125
306 - 457	1001 - 1500	40
458 - 609	1501 - 2000	20
610 - 762	2001 - 2500	10
763 - 914	2501 - 3000	10
915 - 1066	3001 - 3500	6
1067 - 1219	3501 - 4000	5
Above 1219	Above 4000	5

Limits of Effective Radiated Power (ERP) Corresponding to Effective Antenna Heights of Base Stations in the Protection Zones and Sharing Zones I and III.

2.3 For base stations in Sharing Zone II, Table A2 lists the limits of Effective Radiated Power (ERP) corresponding to the Antenna Height Above Mean Sea Level ranges shown.

Table A2

Antenna Height Above Mean Sea Level		ERP
Meters	**Feet**	**Watts (Maximum)**
0 - 503	0 - 1650	500
504 - 609	1651 - 2000	350
610 - 762	2001 - 2500	200
763 - 914	2501 - 3000	140
915 -1066	3001 - 3500	100
1067 -1219	3501 - 4000	75
1220 -1371	4001 - 4500	70
1372 -1523	4501 - 5000	65
Above 1523	Above 5000	05

Limits of Effective Radiated Power (ERP) Corresponding to Antenna Heights Above Mean Sea Level of Base Stations in Sharing Zone II.

2.4 Table A3 lists the values of Assumed Average Terrain Elevations (AATE) within the Sharing and Protection Zones on both sides of the United States-Canada border.

where: EAH = (Antenna Height Above Mean Sea Level - AATE)

Table A3

Longitude (Φ) (° West)	Latitude (Ω) (°North)	Assumed Average Terrain Elevation			
		United States		Canada	
		Feet	Meters	Feet	Meters
65 ≤ Φ < 69	Ω < 45	0	0	0	0
65 ≤ Φ < 69	45 ≤ Ω < 46	300	91	300	91
65 ≤ Φ < 69	Ω ≥ 46	1000	305	1000	305
69 ≤ Φ < 73	all	2000	609	1000	305
73 ≤ Φ < 74	all	500	152	500	152
74 ≤ Φ < 78	all	250	76	250	76
78 ≤ Φ < 80	Ω < 43	250	76	250	76
78 ≤ Φ < 80	Ω ≥ 43	500	152	500	152
80 ≤ Φ < 90	all	600	183	600	183
90 ≤ Φ < 98	all	1000	305	1000	305
98 ≤ Φ < 102	all	1500	457	1500	457
102 ≤ Φ < 108	all	2500	762	2500	762
108 ≤ Φ < 111	all	3500	1066	3500	1066
111 ≤ Φ < 113	all	4000	1219	3500	1066
113 ≤ Φ < 114	all	5000	1524	4000	1219
114 ≤ Φ < 121.5	all	3000	914	3000	914
121.5 ≤ Φ < 127	all	0	0	0	0
Φ ≥ 127	54 ≤ Ω < 56	0	0	0	0
Φ ≥ 127	56 ≤ Ω < 58	500	152	1500	457
Φ ≥ 127	58 ≤ Ω < 60	0	0	2000	609
Φ ≥ 127	60 ≤ Ω < 62	4000	1219	2500	762
Φ ≥ 127	62 ≤ Ω < 64	1600	488	1600	488
Φ ≥ 127	64 ≤ Ω < 66	1000	305	2000	609
Φ ≥ 127	66 ≤ Ω < 68	750	228	750	228
Φ ≥ 127	68 ≤ Ω < 69.5	1500	457	500	152
Φ ≥ 127	Ω ≥ 69.5	0	0	0	0

Table B

Location	Latitude	Longitude
Akron, Ohio	41° 05' 00" N	81° 30' 40" W
Youngstown, Ohio	41° 05' 57" N	80° 39' 02" W
Syracuse, New York	43° 03' 04" N	76° 09' 14" W
Kitchener-Waterloo, Ont.	43° 27' 30" N	80° 30' 00" W
Peterborough, Ontario	44° 18' 00" N	78° 19' 00" W

Center coordinates of cities in the United States and Canada that for purposes of this agreement shall be considered as falling outside of Sharing Zone I.

Table C1

Effective Antenna Height(EAH)		PFD
Meters	Feet	dBW/m² (Maximum)
0 - 152	0 - 500	-84
153 - 305	501 - 1000	-90
306 - 457	1001 - 1500	-95
458 - 609	1501 - 2000	-98
610 - 762	2001 - 2500	-101
763 - 914	2501 - 3000	-101
915 - 1066	3001 - 3500	-103
1067 - 1219	3501 - 4000	-104
Above - 1219	Above - 4000	-104

Limits of Power Flux Density (PFD) Corresponding to Effective Antenna Heights of Base Stations in Sharing Zones I and III.

Table C2

Antenna Height (AMSL)		PFD
Meters	**Feet**	**dBW/m² (Maximum)**
0 - 503	0 - 1650	-87
504 - 609	1651 - 2000	-88.5
610 - 762	2001 - 2500	-91
763 - 914	2501 - 3000	-92.5
915 - 1066	3001 - 3500	-94
1067 - 1219	3501 - 4000	-95
1220 - 1371	4001 - 4500	-95.5
1372 - 1523	4501 - 5000	-96
Above - 1523	Above - 5000	-107

Limits of Power Flux Density (PFD) Corresponding to Antenna Heights Above Mean Sea Level of Base Stations in Sharing Zone II.