Industry Canada Industrie Canada

SRSP-510
Issue 5
February 2009

Spectrum Management and Telecommunications

Standard Radio System Plan

Technical Requirements for Personal Communications Services (PCS) in the Bands 1850-1915 MHz and 1930-1995 MHz

Aussi disponible en français – PNRH-510

Canada

Preface

Issue 5 of SRSP-510 is hereby released.

Changes include:

- Maximum permissible equivalent isotropically radiated power (e.i.r.p.) limits for base stations with channel bandwidth greater than 1 MHz are defined by a power spectral density model.

The e.i.r.p. limit modification better accommodates wideband systems by employing a more technology-neutral approach to defining e.i.r.p. limits.

This Standard Radio System Plan (SRSP) replaces SRSP-510, Issue 4.

Issued under the authority of
the Minister of Industry

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Marc Dupuis
Director General
Spectrum Engineering Branch

Contents

1. Intent

1.1 This Standard Radio System Plan (SRSP) sets out the minimum technical requirements for the efficient utilization of the bands 1850-1915 MHz and 1930-1995 MHz for personal communications services (PCS).

1.2 This SRSP specifies the technical 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 This SRSP is based on the current modulation schemes of PCS technologies chosen by service providers to implement PCS in Canada.

2.2 Notwithstanding the fact that a system satisfies the requirements of this SRSP, Industry Canada shall require adjustment to radio and auxiliary equipment in radio stations whenever harmful interference[1] is caused to any radio station.

2.3 Radio systems conforming to these technical requirements will be given priority in licensing over non-standard radio systems operating in these bands. The arrangements for non-standard systems are outlined in the document entitled Spectrum Utilization Policies, *General Information Related to Spectrum Utilization and Radio Systems Policies* (SP-Gen).

2.4 Revisions to this SRSP will be made as required.

3. Related Documents

3.1 The following documents, as amended from time to time, outline the policy framework and radio licence application requirements for PCS.

3.1.1 **Radiocommunication Regulations (RR)**
http://ic.gc.ca/epic/internet/insmt-gst.nsf/en/sf01265e.html

3.1.2 **SP-Gen**
http://ic.gc.ca/epic/internet/insmt-gst.nsf/en/sf01049e.html

[1] For the purpose of this SRSP, harmful interference means interference that endangers the functioning of a radionavigation service or 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.*

3.1.3 **Canada Gazette Notice DGTP-005-95/DGRB-002-95**, *Policy and Call for Application: Wireless Personal Communications Services in the 2 GHz Range*
http://www.ic.gc.ca/epic/site/smt-gst.nsf/en/sf01540e.html

3.1.4 **Canada Gazette Notice DGRB-005-00/DGTP-007-00**, *Policy and Licensing Procedures for the Auction of the Additional PCS Spectrum in the 2 GHz Frequency Range*
http://ic.gc.ca/epic/site/smt-gst.nsf/en/sf05249e.html

3.1.5 *Amendments, Supplements, Questions and Answers to the Policy and Licensing Procedures for the Auction of Additional Spectrum in the 2 GHz Frequency Range*, October 2000
http://ic.gc.ca/epic/site/smt-gst.nsf/en/sf02136e.html

3.1.6 *Sharing Arrangement Between the Department of Industry of Canada and the Federal Communications Commission of the United States of America Concerning the Use of the Frequency Bands 1850 to 1915 MHz and 1920 to 1995 MHz by the Personal Communications Service Along the Canada-United States Border*

3.1.7 **Canadian Table of Frequency Allocations**
http://ic.gc.ca/epic/internet/insmt-gst.nsf/en/h_sf01678e.html

3.1.8 **Radio Standards Procedure**, *Application Procedures for Planned Radio Stations Above 960 MHz in the Fixed Service* (RSP-113)
http://ic.gc.ca/epic/internet/insmt-gst.nsf/en/sf00025e.html

3.1.9 **Radio Standards Specification**, *2 GHz Personal Communications Services* (RSS-133)
http://ic.gc.ca/epic/internet/insmt-gst.nsf/en/sf01520e.html

3.1.10 **Client Procedures Circular**, *Radiocommunication and Broadcasting Antenna Systems* (CPC-2-0-03)
http://ic.gc.ca/epic/internet/insmt-gst.nsf/en/sf01031e.html

3.1.11 **Client Procedures Circular**, *Displacement of Fixed Service Stations Operating in the 2 GHz Frequency Range to Accommodate Licensed Personal Comunications Services (PCS)* (CPC-2-1-09)
http://ic.gc.ca/epic/internet/insmt-gst.nsf/en/sf01149e.html

3.1.12 **Client Procedures Circular**, *Spectrum Licence Fee Calculation for Cellular and Incumbent Personal Communications Services (PCS)* (CPC-2-1-10)
http://ic.gc.ca/epic/internet/insmt-gst.nsf/en/sf01291e.html

3.1.13 **Client Procedures Circular**, *Licensing Procedure for Spectrum Licences for Terrestrial Services* (CPC-2-1-23)
http://www.ic.gc.ca/epic/site/smt-gst.nsf/en/sf04589e.html#sect5

3.1.14 **Safety Code 6,** *Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz*
http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/99ehd-dhm237/intro_e.html

3.1.15 **Canada Gazette Notice DGTP-002-07**, *Consultation on a Framework to Auction Spectrum in the 2 GHz Range including Advanced Wireless Services*
http://ic.gc.ca/epic/site/smt-gst.nsf/en/sf08542e.html

3.1.16 **Canada Gazette Notice DGTP-007-07**, *Policy Framework for the Auction for Spectrum Licences for Advanced Wireless Services and Other Spectrum in the 2 GHz Range*
http://ic.gc.ca/epic/site/smt-gst.nsf/en/sf08833e.html

3.1.17 **Canada Gazette Notice DGRB-011-07**, *Licensing Framework for the Auction for Sprectrum of Spectrum Licences for Advanced Wireless Services and other Spectrum in the 2 GHz Range*
http://www.ic.gc.ca/epic/site/smt-gst.nsf/en/sf08854e.html

3.2 Information Documents

The following documents may be of interest for the implementation of PCS related to this SRSP:

3.2.1 **Spectrum Utilization Policy**, *Amendments to the Microwave Spectrum Utilization Policies in the 1-3 GHz Frequency Range* (SP 1-3 GHz)
http://ic.gc.ca/epic/internet/insmt-gst.nsf/en/sf01918e.html

3.2.2 **Canada Gazette Notice DGTP-002-95**, *Revisions to Microwave Spectrum Utilization Policies in the Range of 1-20 GHz*
http://ic.gc.ca/epic/internet/insmt-gst.nsf/en/sf01533e.html

3.2.3 **Standard Radio System Plan**, *Technical Requirements for the Fixed Line-of-Sight Radio Systems Operating in the Band 1700-1850 MHz* (SRSP-301.7)
http://ic.gc.ca/epic/internet/insmt-gst.nsf/en/sf01268e.html

3.2.4 **Standard Radio System Plan**, *Technical Requirements for Fixed Line-of-Sight Radio Systems Operating in the Bands 2025-2110 MHz and 2200-2285 MHz* (SRSP-302.0)
http://ic.gc.ca/epic/internet/insmt-gst.nsf/en/sf02145e.html

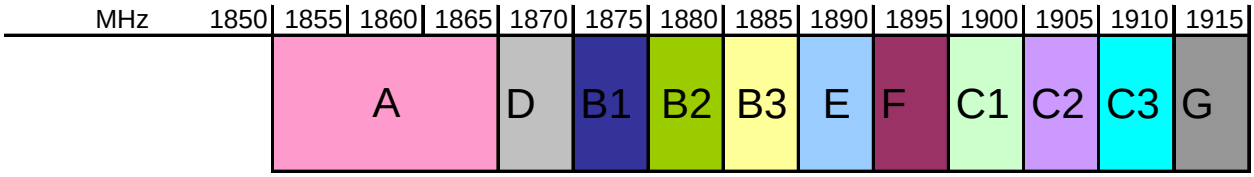
3.2.5 **TIA/EIA Telecommunications Systems Bulletin (TSB10)**, *Interference Criteria for Microwave Systems as amended*
http://www.tiaonline.org/

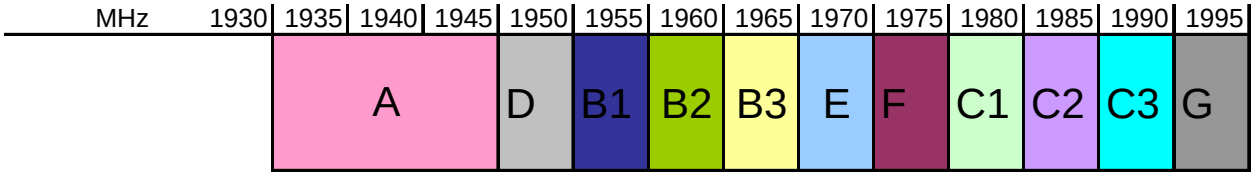
3.2.6 **TIA/EIA Telecommunications Systems Bulletin (TSB84)** as amended, *Licensed PCS to PCS Interference*
http://www.tiaonline.org/

4. Band Plan

4.1 The bands 1850-1915 and 1930-1995 MHz are divided into two sub-bands: the lower sub-band (1850-1915 MHz) and the upper sub-band (1930-1995 MHz). These sub-bands are further divided into 11 paired blocks with a frequency separation of 80 MHz: 10 blocks of 10 MHz (5 + 5) and one block of 30 MHz (15 + 15) as follows:

Block Sizes





Block	Total Spectrum	Lower Sub-band	Upper Sub-band
Block A	30 MHz	1850-1865 MHz	1930-1945 MHz
Block D*	10 MHz	1865-1870 MHz	1945-1950 MHz
Block B1	10 MHz	1870-1875 MHz	1950-1955 MHz
Block B2*	10 MHz	1875-1880 MHz	1955-1960 MHz
Block B3*	10 MHz	1880-1885 MHz	1960-1965 MHz
Block E*	10 MHz	1885-1890 MHz	1965-1970 MHz
Block F	10 MHz	1890-1895 MHz	1970-1975 MHz
Block C1*	10 MHz	1895-1900 MHz	1975-1980 MHz
Block C2*	10 MHz	1900-1905 MHz	1980-1985 MHz
Block C3*	10 MHz	1905-1910 MHz	1985-1990 MHz
Block G	10 MHz	1910-1915 MHz	1990-1995 MHz

* The usage of these blocks in certain geographic areas is under policies listed in sections 3.1.3, 3.1.4, 3.1.5 and 3.1.15.

4.1.1 If frequency division duplexing (FDD[2]) techniques are applied in the sub-bands mentioned in section 4.1, radio systems should use the lower sub-band for mobile transmit operations and the upper sub-band for base transmit operations.

Systems using time division duplexing (TDD[3]) techniques may operate in both the lower and upper sub-bands. However, these systems must operate within the technical rules underlined in sections 5.1.1 and 5.1.2. Nothwithstanding the duplexing techniques used, all systems shall conform to the technical requirements set forth in this SRSP.

4.2 Usage of the bands 1850-1915 MHz and 1930-1995 MHz within the Canada-United States border area is subject to the provisions of the *Sharing Arrangement Between the Department of Industry of Canada and the Federal Communications Commission of the United States of America Concerning the Use of the Frequency Bands 1850 to 1915 MHz and 1920 to 1995 MHz by the Personal Communication Service Along the Canada-United States Border.*

5. Technical Criteria

5.1 Radiated Power and Antenna Height Limits

5.1.1 Base Stations

For base stations with channel bandwidth equal to or less than 1 MHz, the maximum equivalent isotropically radiated power (e.i.r.p.) is limited to 3280 watts with an antenna height above average terrain (HAAT) up to 300 metres. Base stations operating in urban areas[4] are limited to a maximum allowable e.i.r.p. of 1640 watts. Base station antenna heights above average terrain may exceed 300 metres with a corresponding reduction in e.i.r.p. according to the following table:

HAAT[5](in metres)	**Maximum e.i.r.p. (watts)**
≤ 300	3280 or 1640[6]
≤ 500	1070
≤1000	490
≤1500	270
≤2000	160

2 FDD is a technology that permits transmission and reception of signals on two different frequencies separated in the frequency spectrum by a predeterminated value (80 MHz in the case of PCS).

3 TDD is a technology that permits transmission and reception of signals on the same frequency by alternating time slots for transmission and reception.

4 Urban areas are defined in Statistics Canada Census Dictionary and in *A National Overview – Population and Dwelling Counts (Data Products: 1996 Census of Population*), Catalogue number 93-357-XPB.

5 HAAT: height above average terrain, determined by subtracting average terrain elevation from antenna height above mean sea level.

6 See paragraphs 1 and 2 of section 5.1.1.

For base stations with a channel bandwidth greater than 1 MHz, the maximum e.i.r.p. is limited to 3280 watts/MHz e.i.r.p. (i.e., no more than 3280 watts e.i.r.p. in any 1 MHz band segment) with an antenna height above average terrain (HAAT) up to 300 metres. Fixed or base stations operating in urban areas are limited to a maximum allowable e.i.r.p. of 1640 watts/MHz e.i.r.p. Base station antenna heights above average terrain may exceed 300 metres with a corresponding reduction in e.i.r.p. according to the following table:

HAAT [5] (in metres)	**Maximum e.i.r.p. (watts per MHz)**
≤ 300	3280 or 1640[6]
≤ 500	1070
≤1000	490
≤1500	270
≤2000	160

Base stations transmitting in the lower sub-band shall comply with the power limits set forth in section 5.1.2, i.e. the same as mobile stations.

The service area boundary limit specified in section 6 applies.

5.1.2 Mobile Stations

Mobile stations and hand-held portables are limited to 2 watts maximum e.i.r.p. The equipment shall employ means to limit the power to the minimum necessary for successful communication.

5.2 Out-of-Band Emission Limits

5.2.1 Outdoor Operation

When the transmit antenna operates outdoors, the emission in any 1 MHz bandwidth between 1920.1 MHz and 1929.9 MHz shall not exceed -24 dBW e.i.r.p. Power measurement using a spectrum analyzer of smaller bandwidth and with numerical integration is also allowed.

5.2.2 Indoor Operation

When the transmit antenna operates indoors, the emission in any 1 MHz bandwidth between 1920.1 MHz and 1929.9 MHz shall not exceed -50 dBW e.i.r.p. Power measurement using a spectrum analyzer of smaller bandwidth and with numerical integration is also allowed.

6. General Guidelines for Coexistence of Systems Operating in Same Blocks and in Adjacent Areas

In the event that a PCS system using the same frequency block is authorized to different operators in adjacent service areas, coordination of any transmitter installations that are close to the boundary shall be required to eliminate any harmful interference that might otherwise exist and to ensure continuance of equal access to the frequency block by both operators.

To protect stations operating in adjacent service areas from co-channel interference, base stations must not generate a fieldstrength that exceeds 47 dBμV/m outside the operator's service area unless agreed otherwise by the affected operator.

Possible interference conflicts resulting from the operation of two PCS systems may occur. The resolution of those conflicts should be arrived at through mutual arrangements between the affected parties following consultation and coordination.

When potential conflicts between systems cannot be resolved, Industry Canada shall be so advised, whereupon following consultations with the parties concerned, the Department will determine the necessary course of action.

System expansion measures such as addition of cells, cell splitting and sectorization must not force major changes in the system of the other operator, except by mutual agreement between the affected parties. Changes that would have potential impacts on the other operator, including cell site locations, cell sectorization and cell splitting, require consultation with the other operator.

7. General Guidelines for Coexistence of Systems Operating in Adjacent Blocks

Out-of-block emission limits are specified in RSS-133, *2 GHz Personal Communications Services*.

Possible interference conflicts resulting from the operation of two PCS systems operating in adjacent blocks may occur even though the technical specifications of both this SRSP and RSS-133 are met.

The resolution of those conflicts should be arrived at through mutual arrangements between the affected parties following consultation and coordination.

When potential conflicts between systems cannot be resolved, the Department shall be so advised, whereupon following consultations with the parties concerned, it will determine the necessary modifications and/or schedule of modifications.

8. Fixed System Operators in the Bands 1850-1915 and 1930-1995 MHz

The treatment of existing fixed point-to-point radio systems in the above noted bands is addressed in the following two documents: CPC-2-1-09, *Displacement of Fixed Service Stations Operating in the 2 GHz Frequency Range to Accommodate Licensed Personal Communications Services (PCS)*; and Gazette Notice DGTP-002-07, *Consultation on a Framework to Auction Spectrum in the 2 GHz Range including Advanced Wireless Services*.

9. Coexistence with Terrestrial Radio Systems in Adjacent Bands

Coordination may be required with licensees in adjacent bands. In this context, coordination involves consultation between operators to ensure the coexistence between systems in adjacent bands. Licensees should consult Industry Canada for the most up-to-date list of operators in the area.

Possible interference conflicts resulting from the operation of PCS and radio systems in adjacent bands may occur. The resolution of those conflicts should be arrived at through mutual arrangements between the affected parties following consultation and coordination.

When potential conflicts between systems cannot be resolved in a timely fashion, Industry Canada shall be so advised, whereupon following consultations with the parties concerned, the Department will determine the necessary course of action.

9.1 Radio Systems Operating Below 1850 MHz

Fixed line-of-sight point-to-point radio systems operate below 1850 MHz in accordance with SRSP-301.7. Coordination may be required between these systems and PCS operating in the lower sub-band of Block A.

9.2 Fixed Radio Systems Operating Above 2000 MHz

Fixed line-of-sight point-to-point radio systems operate above 2000 MHz in accordance with SRSP-302.0. Coordination may be required between these systems in cases of deployment of PCS base station transmitters operating in block G of the upper sub-band.

10. Cordless PCS Operation

Cordless PCS operation using low-power subscriber devices (e.g. wireless Private Branch Exchange (PBX) using PCS radio frequency channels) is permitted on condition that such usage is by or under the control of a PCS service provider for operation within its licensed spectrum,[7] the integrity of the public PCS service is maintained and that the equipment employed is certified in accordance with the RSS-133 specification. The service provider must fully inform the users of the cordless PCS devices of the requirements imposed on the operation of those devices by RSS-133, in particular the service area limitations and the network control requirements.

[7] See subsections 13(1) and 13(2) of reference document 3.1.7, *Radiocommunication Regulations.*