

United States Department of State

Washington, D.C. 20520

August 28, 1998

Dear Mr. Binder:

This is in response to your letter of August 25, 1998 concerning the technical conditions for implementation of Digital Radio Broadcasting (DRB) services in Canada in the bands 1452-1492 MHz and Digital Radio by Satellite (DARS) services in the United States in the bands 2320-2345 MHz.

I confirm that officials of our two governments have worked out the mutually agreeable details described in the attachments to your letter. Pending conclusion of a binding agreement the United States intends, to the extent possible under its laws, to implement the technical conditions attached to your letter on an interim basis.

Sincerely,

signed by Vonya B. McCann

Ambassador Vonya B. McCann
United States Coordinator
International Communications and
Information Policy

Mr. Michael Binder
Assistant Deputy Minister
Spectrum, Information Technologies and
Telecommunications
Industry Canada

August 25, 1998

U.S. Coordinator and Deputy
Assistant Secretary
Ambassador Vonya McCann
Communications and Information Policy
U.S. Department of States
2201 C Street North West
Washington, D.C.
20520

Dear Ambassador McCann:

I am pleased that officials of Industry Canada and the relevant United States Government agencies have, after lengthy and challenging negotiations, worked out mutually agreeable details of the technical conditions for the implementation of Digital Radio Broadcasting (DRB) services in Canada in the band 1452-1492 MHz and Digital Audio Radio by Satellite (DARS) services in the United States in the band 2320-2345 MHz. These conditions are attached.

The operators of these services are very keen to implement their new services as soon as possible. As a result, I am informing you that Industry Canada intends to implement, to the extend possible under its law, these technical conditions effective September 1, 1998. Since implementation of these technical conditions entails action on the part of the U.S. Government, I would like your assurance that U.S. Government agencies have the same intentions, including reference to the September 1st implementation date.

In parallel, officials of our two Governments are initiating steps toward concluding the formalities to make these technical conditions a binding international agreement in the shortest time possible. I have asked the Department of Foreign Affairs and International Trade to immediately undertake this process on behalf of Canada.

Pending conclusion of a binding agreement, Canada intends to implement the attached technical conditions on an interim basis and we look forward to an early reply confirming the intentions of the United States to do the same.

Yours sincerely,

Michael Binder
Assistant Deputy Minister
Spectrum, Information Technologies
and Telecommunications

Attachments

[AGREEMENT]

Concerning the Coordination between U.S. Satellite Digital Audio Radio Service and Canadian Fixed Service and Mobile Aeronautical Telemetry Service in the band 2320-2345 MHz

Introduction

This document describes an [Agreement] between the Federal Communications Commission (FCC), U.S.A. and the Department of Industry Canada (IC), concerning the coordination between U.S. satellite DARS (BSS(sound)) and Canadian Fixed Services (FS) and Mobile Aeronautical Telemetry Systems (MATS) in the band 2320-2345 MHz.

Background

Bilateral meetings between FCC and IC to discuss satellite DARS/FS/MAT coordination at 2320-2345 MHz began in September 1995. Discussions were based on four proposals in the U.S. to provide satellite DARS from 2320-2345 MHz and proposed service rules. The FCC adopted final service rules and a licensing selection method for U.S. satellite DARS on March 3, 1997. In April 1997, it auctioned 25 MHz of spectrum for two licences for satellite DARS in the 2320-2345 MHz band. Two licences have since been granted to the auction winners and ITU-R APS4/II information for coordination has been provided to the ITU based on these licences.

The majority of Canadian fixed point-to-point systems are currently licensed in channels at 2326 MHz and below. In addition, a number of Canadian MATS systems also operate in the 2320-2345 MHz band and are expected to be subject to interference from DARS emissions. The U.S. recognizes that DARS satellite transmissions and MAT operations are generally incompatible on a co-frequency, co-coverage basis. IC has also expressed its view that it would be difficult for it to accept power flux-density (pfd) constraints higher than the -144/-154 dB(W/m²/4 kHz) (ref. RR No. 2556) on the entire 50 MHz of DARS spectrum and it has therefore requested that the U.S. identify the minimum amount of spectrum required for DARS.

Satellite DARS in the U.S.

One satellite DARS system is licensed by the U.S. to operate in 12.5 MHz of spectrum from 2320-2332.5 MHz. A second satellite DARS system is licensed in the 12.5 MHz of spectrum from 2332.5-2345 MHz. Feeder links for both systems will be implemented in the band 7025-7075 MHz. The licence term for U.S. space systems is 8 years but the expected lifetime of first generation U.S. satellite DARS systems is 15 years and it is likely that the licence terms will be extended or renewed to reflect actual lifetime. Though outside of the scope of this

[Agreement] which pertains to the 2320-2345 MHz band, the U.S. has developed service rules and issued licences for Wireless Communication Services (WCS) in portions of the S-band where Canadian FS and MAT systems operate. WCS licensees are permitted to offer satellite DARS in the 2310-2320 MHz and 2345-2360 MHz bands consistent with the ITU Radio Regulations and the FCC Rules. Satellite DARS use of the WCS spectrum would require a separate coordination agreement between the Administrations.

The service area for satellite DARS systems will include the 48 CONTiguous United States (CONUS) Alaska, Hawaii, and Puerto Rico/Virgin Islands. The maximum pfd level required in the service area of the satellite systems is $-119 \text{ dB(W/m}^2/4 \text{ kHz)}$. The use of terrestrial repeaters, operating within the same spectrum as the licenced space station is anticipated by the licensees to fill in, but not to extend, the satellite footprint where necessary. However, the FCC has not issued final rules for these repeaters. Protection of satellite DARS reception from unacceptable interference from FS and MAT transmitters operating in Canada will be necessary.

FS/MAT in Canada

Current Canadian operations in the 2290-2360 MHz band consists of low capacity point-to-point and subscriber radio systems where a requirement for large or high performance antennas would not be practical. For new systems, while there is some flexibility in the site location and pointing of point-to-point systems, with point-to-multipoint systems there are fewer options to avoid interference. Constraints of a higher value of pfd will limit the use of frequencies in certain areas corresponding to the coverage of the particular co-frequency satellite DARS beam. In addition, a requirement to protect satellite DARS receivers from interference could place operational constraints on Canadian FS use in the border area.

There will be an increased demand for low-capacity fixed systems in the band for services that have been displaced by other newer Canadian services. For example low capacity point-to-point systems will be displaced by PCS and T-DAB. New applicants and licensees have been encouraged to use the lower channels first as an interim measure but this has resulted in more difficult domestic coordination, since the heaviest population of existing FS systems is currently in the lower part of the band. In Canada the frequency bands available for MAT includes the 2320-2345 MHz band and a number of systems are currently in operation.

The [Agreement]

System Characteristics

This [Agreement] establishes sharing conditions between U.S. Satellite DARS and Canadian fixed and mobile systems in the 2320-2345 MHz band. The relevant system characteristics are contained in U.S. information filed with the ITU Radiocommunication Bureau and Canadian information contained in the Appendix. The Appendix includes the current ITU APS4/II information that has been provided by the United States to the ITU (identified as USASAT-28C, USASAT-28D, USASAT-28E, USASAT-28F, and USASAT-28G), and a current listing of Canadian FS/MAT systems (entitled "Existing Canadian FS/MAT systems). The U.S. agrees to supply Canada any ITU APS4/II modifications when sent to the ITU. Any changed parameters of the ITU APS4/II information filed by the U.S. for U.S. satellite DARS systems prior to their launch – with the exception of the pfd specified in the next section – will become effective immediately.

Satellite DARS pfd Level and EIRP Contours

The maximum satellite DARS pfd level for any angle of arrival will not be greater than $-119 \text{ dB(W/m}^2/4 \text{ kHz)}$ in the 2320-2345 MHz band. Coordination under this [Agreement] is based on the maximum pfd value of $-119 \text{ dB(W/m}^2/4 \text{ kHz)}$ along with other relevant parameters derived from the current ITU information as filed with the Radiocommunication Bureau (for the U.S. systems) and the information contained in the Appendix (for Canadian systems). –PFD derivation is based on the power density specified over a 4 kHz bandwidth at the input to the satellite transmit antenna and the satellite transmit antenna equi-gain contours relative to maximum gain specified in 2 dB increments up to 10 dB (and in 10 dB increments thereafter as specified in the information as filed with the Radiocommunication Bureau) and the spreading loss due to the altitude and slant range of the individual space stations. However to facilitate the evaluation of the DARS satellite impact on Canadian FS and MATS systems, the DARS transmit antenna equi-gain contours in the range -10 to -20 dB will be supplied in 2 dB increments.

U.S. Satellite DARS spectrum and service area

This [Agreement] provides for the operation of two satellite DARS systems consisting of the networks designated as USASAT-28C, USASAT-28D, USASAT-28E, USASAT-28F, and USASAT-28G. The pertinent characteristics of these satellite DARS systems are specified in the information filed with the Radiocommunication Bureau, the current version of which is contained in the Appendix. One U.S. satellite DARS system will operate in the 12.5 MHz of spectrum from 2320-2332.5 MHz (at present, USASAT-28C or both USASAT-28D and USASAT-28E) and a second system will operate in the band 2332.5-2345 MHz (at present, USASAT-28F and USASAT-28G). The service area for the licensed satellite DARS systems includes the 48 CONTiguous United States (CONUS). Service to Alaska, Hawaii, and Puerto Rico/Virgin Is. is also permitted. It is understood that U.S. satellite DARS licensees do not intend to provide

service to Canadians in Canada. Therefore, spillover of satellite DARS signals should be minimized to the extent practical.

New Canadian Fixed Systems

For the purpose of this [Agreement], new Canadian fixed systems are defined as systems licensed after the date that this [Agreement] is signed, including existing systems which are modified in such a manner that interference potential increases.

New Canadian fixed systems will not claim protection from U.S. satellite DARS systems operating in accordance with this [Agreement].

New Canadian fixed systems in the 2320-2345 MHz band shall not exceed a pfd of $-155 \text{ dB(W/m}^2/4 \text{ kHz)}$ at U.S. satellite DARS receivers, within the United States.

Existing Canadian Fixed and Existing and Future MATS Systems

For the purpose of this [Agreement] the existing fixed and MATS systems are described in the Appendix.

In order to provide the maximum possible transition period for existing fixed and MATS systems operating in Canada in accordance with existing Agreements, existing fixed and existing MATS systems in Canada will be protected from interference from U.S. satellite DARS systems for a minimum of 18 months after the date that this [Agreement] is signed. Launch and operational testing of the first DARS satellites is expected to be as early as 18 months after the date that this [Agreement] is signed. Existing fixed and existing and future MATS systems in Canada may be afforded protection for a transition period not to exceed a maximum of 24 months after the date that this [Agreement] is signed, depending upon the actual launch and operational testing dates of the DARS satellites. To facilitate the transition process, the FCC agrees to provide information concerning launch, operational testing, and in-service dates of the satellite DARS systems referred to in this [Agreement]. After the end of the transition period, if any, existing fixed and MATS systems in Canada will not claim protection from the U.S. satellite DARS systems operating in accordance with this [Agreement].

Existing and Future MATS systems in Canada (after 18 months plus the end of the transition period, if any) will both:

- (1) not claim protection from U.S. satellite DARS; and
- (2) either be moved out of the 2320-2345 MHz band entirely, or not be utilized within line of sight (considering the altitude of the MATS transmitter) of the U.S. border.

In cases where satellite DARS systems are brought into service prior to 24 months after the date that this [Agreement] is signed, it is understood that operators of the satellite DARS systems and the operators of affected existing fixed terrestrial systems in Canada will develop mutual Arrangements, to address potential interference situations.

Satellite DARS feeder links

The U.S. will licence its satellite DARS feeder links in the band 7025-7075 MHz. It is agreed that coordination of the satellite DARS Feeder Link Earth stations will be conducted using the routine ITU process (e.g. Appendix 28 and relevant ITU-R Recommendations). The U.S. agrees to provide appropriate ITU information to IC as it becomes available.

Cross-polarization

U.S. satellite DARS operators are permitted to use circular cross-polarization within their assigned spectrum.

Satellite DARS Terrestrial Repeaters

It is anticipated that, subject to completion of the FCC rulemaking process, satellite DARS operators will be permitted to construct and operate terrestrial transmitters under the following conditions:

- (1) the terrestrial repeaters will be used to retransmit signals received from their operating DARS satellites on the exclusive frequency assignment of the licensee and for use of the same bandwidth as the satellite space stations;
- (2) the terrestrial repeaters shall not be used to extend satellite DARS coverage outside of the satellite systems' authorized service area;
- (3) the two Administrations agree that coordination of terrestrial repeaters is not necessary provided that the individual repeaters do not exceed a power flux density of $-119 \text{ dB(W/m}^2/4 \text{ kHz)}$ at and beyond the common border.

The pfd limit applies to all land areas, including islands, lying within the U.S. territories. Computations of the pfd shall be based on calculations taking account of available intervening terrain propagation loss (shielding) of a satellite DARS repeater, if any, plus free space calculations as described below:

$$\text{pfd(dBW/m}^2) = 10\log(\text{EIRP}/4\pi\text{D}^2);$$

Where:

$$\text{EIRP} = 1.64 \times \text{ERP}$$

EIRP is the power relative to an isotropic radiator in Watts at the azimuth of interest;

ERP is the power relative to a dipole in Watts at the azimuth of interest.

If the terrestrial repeater pfd threshold is exceeded, the assignment shall be subject to coordination on a case-by-case basis.

The U.S. agrees to provide IC with the operating parameters of all new or modified satellite DARS terrestrial repeater assignments which exceed the agreed pfd value. The information which will be provided to IC includes:

- Location (Community/State);
- Geographic coordinates of transmitting antenna;
- EIRP (including line loss) value;
- Ground elevation and antenna height above ground;
- Center frequency;
- Polarization;
- Antenna pattern/tabulation of the pattern (if requested);
- Azimuth of the main lobe;
 - Frequency stability of the transmitter;
 - Bandwidth and Emission designation.

Canada and the U.S. agree to notify the ITU that the coordination of the subject networks is completed under this [Agreement]. It is understood that this [Agreement] can be reviewed at the request of either party.

Appendix

USASAT-28C, USASAT-28D, USASAT-28E, USASAT-28F and USASAT-28G

Note: The current ITU APS4/II information (identified above) that has been provided by the United States to the ITU is not available electronically.

Appendix

Existing Canadian FS/MATS Systems

TX Frequency MHz	RX Frequency MHz	Call Sign	Station Location	Lat.	Long.	BW MHz	Emiss.	ERP Watts	Azim.	Pol.	Ant. Ht meters	Elev. meters
2315.5	2545.5	CGD956	JOUTEL, QC	492715	781927	10M00	G7WDT	25.3	91.6	H	32	294
2315.5	2545.55	CGE661	JARAY, QC	511907	780841	10M00	G7WDT	33.5	92.7	V	89	160
2316.25	2546.25	VBH241	BEAR MTN, BC	554352	1202641	10M00	G7WDT	25.4	264.8	V	80	992
2317	2417	XNR575	STEEP RIDGE, ALTA	543916	1185938	6M00	G7WDT	28.3	122.3	V	24	1067
2317	2417	XKP644	SNUFF MOUNTAIN, AB	544040	1173210	6M00	G7WDT	28.4	96.5	H	23	930
2317	2417	XKP639	TWO CREEKS, ALTA	541811	1162646	6M00	G7WDT	28.4	122.2	V	23	951
2317	2417	XKP638	LESSARD, ALBERTA	534647	1144522	6M00	G7WDT	35	105.3	H	45	773
2317	2417	XOF801	BONNIE GLEN, ALBERTA	530240	1135705	6M00	G9WDT	26.5	39.9	V	85	904
2317	2417	CGJ903	TOWERS RIDGE, ALBERTA	510628	1142943	5M00	G9DET	32.8	95.7	V	40	1288
2317	2417	VOO509	CARBERRY, MANITOBA	495602	992312	6M00	G9WDT	30.2	319	V	73	395
2317	2417	VBB815	JOANNES, QC	481311	784222	6M00	G7WDT	25.8	281.9	V	30	351
2317	2417	XOJ639	ST-HYACINTHE, QC	453746	730012	6M10	G7WXT	26	143	V	10	30
2317	2417	VBB709	RAWDON, QC	460307	734036	6M10	G7WXT	28.5	99.1	H	12	244
2317	2417	XOJ98	KINGSEY, QC.	455028	720014	6M00	G7WDT	36.1	324.2	H	63	131
2317	2417	XOA35	VICTORIAVILLE, QC.	460459	715655	6M00	G7WDT	24.9	269.6	V	29	138
2317	2417	XKH295	MAIN BROOK, NEWFOUNDLAND	511105	560134	6M00	G7WDT	32.6	57.6	V	15	31
2317	2417	CGE935	ROTHESAY, NEW BRUNSWICK	452202	655711	6M00	G7WDT	20.6	219	H	82	111
2317	2417	VBU678	IMPERIAL MILLS, AB	545958	1114806	1M60	D7WDT	30.2	291.2	H	76	640
2317	2417	VBG822	MT. TAPPEN, B.C.	504531	1192153	5M00	F7DWT	28.4	68.5	H	31	1505
2317	2417	CZW282	PAINT MTN, YT	604939	1373013	6M00	G7WDT	30.5	182.5	V	11	1382
2317	2471	CZW336	CARCROSS, YT	601111	1344722	6M00	G7WDT	30.5	116.2	V	9	1083
2317	2417	CGE815	VICTORIA, B.C.	482531	1232008	5M00	G7WDT	27.3	276.2	V	52	72
2317	2417	XLB654	TEXADA ISLAND, BC	494149	1242606	5M00	G7WDT	26.2	149.7	V	25	510
2317	2417	CGE888	PORT MOODY, BC	491755	1224956	5M00	G7WDT	24.6	235.8	V	60	228
2317	2417	XKU581	HAYCROFT, ONTARIO	421520	823241	5M00	D7WET	29.5	60.3	H	47	183
2317	2417	VBB818	AMOS, QC	483433	780942	6M00	G7WDT	22	192.7	H	88	335
2317	2417	CFG824	SCRIVER CREEK, YT	655041	1374050	4M80	D7WET	33.7	211.4	H	14	917

TX Frequency MHz	RX Frequency MHz	Call Sign	Station Location	Lat.	Long.	BW MHz	Emiss.	ERP Watts	Azim.	Pol.	Ant. Ht meters	Elev. meters
2317	2417	CFG826	RICHARDSON MOUNTAINS, YT	664024	1362337	4M80	D7WET	33.7	204.5	V	14	863
2317	2417	VAD425	OMEEMEE, ONTARIO	441716	783544	5M00	D7WDT	29.4	78.8	H	80	315
2317	2417	XOJ623	CURIERES, QC.	463902	745128	6M10	G7WXT	29.8	95.7	V	135	620
2317	2417	VGB203	BLUE GROUSE MTN, B.C.	495758	1193118	6M00	G7WDT	26.5	122.2	V	8	1149
2317	2417	VBY362	OKANAGAN FALLS, BC	492139	1193630	6M00	G7WDT	26.3	15.8	V	30	640
2317	2417	CGE822	CHILLIWACK, BC	490652	1215407	6M00	G7WDT	26.9	36.8	H	30	236
2317	2417	CFR966	PEMBERTON, BC	502120	1224640	6M00	G7WDT	19.4	205.9	V	58	1192
2317	2417	XOJ670	SEPT-ILES, QC	501718	662409	5M00	F8WXF	25.6	168	V	17	66
2317	2417	CFG822	ENGINEER CREEK, YT	652103	1381740	4M80	D7WET	33.7	177.5	V	14	1321
2317	2417	CFG817	NORTH KLONDIKE RIVER, YT	642234	1382237	4M80	D7WET	29.8	206.5	V	59	909
2317	2417	CFG820	NORTH FORK PASS, YT	644143	1382556	4M80	D7WET	33.1	151.3	H	14	1178
2317	2417	CGJ787	PARSONS, NWT	685350	1335613	5M00	D9DET	31.2	34.1	V	70	259
2317	2417	XOF798	BEAVERHILL LAKE, ALBERTA	532715	1125300	6M00	G9WDT	27.4	120.3	H	58	744
2317	2417	XKP958	FORT MACLEOD, ALBERTA	495005	1132320	6M00	D7WET	29.1	334.4	H	107	1008
2317	2417	XOF796	VIKING, ALBERTA	531115	1114523	6M00	G9WDT	27.7	92.4	V	54	701
2317.5	2417.5	VBU204	BEISEKER, ALBERTA	512310	1131605	1M60	D7WET	30.9	55.3	V	45	953
2322.25	2422.25	VEZ694	GLADYS RIDGE, AB	504246	1134031	1M50	D7WDT	24.6	322.1	H	31	1105
2322.25	2422.25	VEZ696	NOBLEFORD, ALTA	495041	1130738	1M50	D7WDT	27.6	343.9	V	85	983
2323	2423	XKP921	EDMONTON, ALTA	533109	1132605	6M00	G9WDT	21.6	109.1	H	20	686
2323	2423	XOF801	BONNIE GLEN, ALBERTA	530240	1135705	6M00	G9WDT	28.1	298.7	V	85	904
2323	2423	VEZ679	MEDICINE LODGE HILLS, ALBERTA	522700	1141531	6M00	G7WDT	30.7	253.8	H	95	1113
2323	2423	XKX933	FREELTON, ONTARIO	432450	800340	6M00	G7WDT	22.9	110.7	H	52	279
2323	2423	CGD982	MONT-VALIN, QC	483604	704946	6M00	G7WDT	30.2	219.3	H	49	907
2323	2423	CGE893	WHISTLER, B.C.	500913	1225816	6M00	G7WDT	24.4	197.9	H	19	820
2323	2423	XMD471	OSOYOOS, BC	490156	1192812	6M00	G7WDT	26.1	308.5	V	30	305
2323	2423	XMD625	OKANAGAN MOUNTAIN, BC	494244	1193630	6M00	G7WDT	26.5	168.8	H	25	1575
2323	2423	VBW903	PORT ALBERNI, BC	491257	1245036	6M00	G7WDT	29.1	38.1	H	13	457
2323	2423	VBY351	INVERMERE, BC	502917	1155706	6M00	G7WDT	28.4	321.8	H	20	1067
2323	2423	XOA749	WALLENSTEEN, BC	503824	1192730	5M00	G7WDT	30.9	3.9	H	24	1714
2323	2423	VBH883	FLY HILL, BC	504352	1192655	5M00	G7WDT	21.7	324.9	V	12	1753
2323	2423	XLB652	ABBOTSFORD, B.C.	490030	1221200	5M00	G7WDT	26	298.1	H	30	10

TX Frequency MHz	RX Frequency MHz	Call Sign	Station Location	Lat.	Long.	BW MHz	Emiss.	ERP Watts	Azlm.	Pol.	Ant. Ht meters	Elev. meters
2323	2423	VAM718	SPRUCE GROVE, ALBERTA	533738	1141405	6M00	D7DDT	32.1	262.6	V	102	789
2323	2423	XOF798	BEAVERHILL LAKE, ALBERTA	532715	1125300	6M00	G9WDT	27.4	279.1	H	59	744
2323	2423	XOF796	VIKING, ALBERTA	531115	1114523	6M00	G9WDT	27.6	283.3	V	54	701
2323.75	2423.75	VBU677	SPRUCE VALLEY, ALTA	545045	1124851	3M20	D7WDT	28.1	339.5	H	15	640
2325.25	2425.25	VEZ694	GLADYS RIDGE, AB	504246	1134031	1M50	D7WDT	25.1	149.6	H	30	1105
2325.25	2425.25	VEZ696	NOBLEFORD, ALTA	495041	1130738	1M50	D7WDT	32.4	126.5	V	76	983
2329	2559	XOA648	CAMPBELL RIVER, B.C.	500105	1251450	10M00	G7WDT	29.8	307.1	V	60	58
2329.5	2429.5	VBU204	BEISEKER, ALBERTA	512310	1131605	1M60	D7WET	32.6	339.1	H	50	953
2329.5	2429.5	XKP633	CALGARY, AB	510005	1140248	1M60	D7WET	31.3	45.9	V	38	1059
2330.25	2560.3	CZW330	JEDNEY, BC	571333	1221316	3M50	G7WDT	13	0	V	18	1119
2330.75	2430.75	XLB877	MT SEYMOUR, BC	492112	1225718	3M50	G7WDT	6.1	268.5	V	24	846
2330.75	2430.75	XLB877	MT SEYMOUR, BC	492112	1225718	3M50	G7WDT	12.4	151	V	15	846
2330.75	2430.75	XLB877	MT SEYMOUR, BC	492112	1225718	3M50	G7WDT	23.5	113.3	H	18	846
2330.75	2430.75	XLB877	MT SEYMOUR, BC	492112	1225718	3M50	G7WDT	6.8	238.4	H	27	846
2330.75	2430.75	XLB877	MT SEYMOUR, BC	492112	1225718	3M50	G7WDT	12.4	151	V	15	846
2335	2435	CGA694	SALTSRING ISLAND, BC	484555	1233035	6M00	G7WDT	28	82.3	H	34	680
2335	2565	XOA661	PARKSVILLE, B.C.	491740	1241910	10M00	G7WDT	25	268.9	H	26	250
2335	2435	CGA694	SALTSRING ISLAND, BC	484555	1233035	6M00	G7WDT	24.7	321.3	H	33	680
2337	2567	VBY675	SOUTH SUKUNKA, BC	551801	1214058	3M40	G7WDT	16.7	172.8	H	38	719
2337	2567	VBY673	PERRY CREEK, BC	550945	1210824	3M40	G7WDT	10.2	132.9	V	32	1335
2337.25	2557.3	CFG909	PINK MOUNTAIN, BC	570416	1225221	3M50	G7WDT	13	0	V	18	1776
2337.25	2557.3	CFG911	BLUEBERRY FARM, BC	564015	1212822	3M50	G7WDT	13	0	V	18	751
2341	2602	VX9NVT	WINNIPEG, MB	495200	971200	6M00	D7WDT	6.5	0	H	7	233
2341	2602	VX9NVU	WINNIPEG, MB	495200	970800	6M00	D7WDT	6.5	0	H	7	233
2341.25	2441.25	XLB877	MT SEYMOUR, BC	492112	1225718	3M50	G7WDT	15	206.1	H	15	846
2341.25	2441.25	XLB884	HUNTINGTON, BC	490012	1221312	3M50	G7WDT	29.2	26.8	V	9	8
2344	2574	VBY691	BRAZILION PLANT, BC	552355	1220826	3M40	G7WDT	16.6	110.7	V	19	1013
2344	2574	VBY678	BULLMOOSE, BC	550858	1212703	3M40	G7WDT	12.2	22.6	V	23	1095
2344	2574	VBY680	FEARLESS, BC	544835	1203511	3M40	G7WDT	7.3	10	V	34	1179
2344	2574	VBY673	PERRY CREEK, BC	550945	1210824	3M40	G7WDT	25.5	293.2	H	47	1335
2344.25	2574.25	CFG844	MONTEITH CREEK, BC	563000	1220352	3M50	G7WDT	16.1	0	V	18	731

TX Frequency MHz	RX Frequency MHz	Call Sign	Station Location	Lat.	Long.	BW MHz	Emiss. Watts	ERP Watts	Azim.	Pol.	Ant. Ht meters	Elev. meters
2344.25	2574.3	CZW268	ATICK CREEK, BC	570955	1224019	3M50	G7WDT	11.5	0	V	35	1263
2344.25	2574.3	CFG910	GLEAM, BC	573154	1211317	3M50	G7WDT	12	0	V	27	915
2351	2581	VBY685	AS 9, BC	545651	1210925	3M40	G7WDT	4.4	21	V	29	783
2351	2581	VBY686	AS 10, BC	545158	1210720	3M40	G7WDT	14.8	0.3	V	21	1176
2351	2581	VBY687	LBV 53, BC	545640	1210852	3M40	G7WDT	4.4	16.5	V	29	770
2351	2581	VBB970	MINE ORLEANS, QC	490826	713328	3M40	G7WDT	21	76.9	V	5	287
2351	2581	VBB971	CHUTES DES PASSES, QC	495105	711025	3M40	G7WDT	31.3	195.1	V	28	580
2351	2581	VBY669	SUKUNKA JUNCTION NORTH, BC	552036	1213929	3M40	G7WDT	6.8	214.1	V	22	1310
2351.25	2581.25	CFG837	INDIAN UNION PACIFIC, BC	562854	1221923	3M50	G7WDT	16.4	286	V	45	728
2351.25	2581.25	CFG844	MONTEITH CREEK, BC	563000	1220352	3M50	G7WDT	30.1	267.6	V	18	731
2351.25	2581.25	CFG843	CRYSTAL SPRING FARM, BC	563102	1221735	3M50	G7WDT	19.4	244.4	V	7	670
2351.25	2581.25	CFG842	GRAHAM HALFWAY RIVER, BC	563112	1221527	3M50	G7WDT	30.4	248.9	V	18	777
2351.25	2581.25	CFG841	CRYSTAL SPRING FARM, BC	563037	1221310	3M50	G7WDT	18.9	259	V	15	651
2351.25	2581.25	CFG840	ART MCLEAN RANCH, BC	563058	1221058	3M50	G7WDT	23.7	258	V	15	650
2351.25	2581.25	CFG839	GEORGE GIENIE, BC	563050	1220835	3M50	G7WDT	23.7	260.9	V	15	656
2351.25	2581.25	CFG836	GRAHAM RIVER FARMS, BC	562745	1222042	3M50	G7WDT	25.4	321	V	7	701
2351.25	2581.25	CFG835	FEDERAL RANCH, BC	562618	1222336	3M50	G7WDT	18.7	3.1	V	15	735
2351.25	2581.25	CFG909	PINK MOUNTAIN, BC	570416	1225221	3M50	G7WDT	30	102	V	17	1776
2351.25	2581.25	CFG910	GLEAM, BC	573154	1211317	3M50	G7WDT	30	191	V	18	915
2351.25	2581.3	CZW330	JEDNEY, BC	571333	1221316	3M50	G7WDT	30	173	V	14	1119
2351.25	2581.3	CZW268	ATICK CREEK, BC	570955	1224019	3M50	G7WDT	29.4	123	V	27	1263
2351.25	2581.25	CFG832	BRUCE SIMPSON, BC	563630	1222701	3M50	G7WDT	23.7	163.6	V	15	729
2351.25	2581.25	CFG833	DAVE SIMPSON, BC	563539	1222600	3M50	G7WDT	24.4	166.3	V	7	717
2351.25	2581.25	CFG838	SAM CRAIK, BC	562936	1221545	3M50	G7WDT	18.7	268	V	15	701
2351.25	2581.25	CFG834	GERRY HEYER CAMP, BC	562552	1222739	3M50	G7WDT	19.1	33.5	V	7	758
2417	2317	CJV368	IOSEGUN, ALBERTA	543849	1170500	6M00	G7WDT	28.4	276.9	H	23	793
2417	2317	XOF799	BUFFALO CREEK, AB	531020	1111150	6M00	G9WDT	27.2	272.8	V	68	709
2417	2317	XKP957	PARKLAND, ALBERTA	501458	1134200	6M00	D7WET	28	154.2	H	107	1097
2417	2317	XOF797	POE, ALBERTA	531620	1122200	6M00	G9WDT	28.1	300.8	H	38	689
2417	2317	XKP636	BELL LAKE, ALTA	533918	1140008	6M00	G7WDT	32.9	285.9	H	75	786
2417	2317	XOJ435	NICOLET, QC	460452	721512	6M00	G7WDT	22.8	89.3	V	65	100

TX Frequency MHz	RX Frequency MHz	Call Sign	Station Location	Lat.	Long.	BW MHz	Emiss. Watts	ERP Watts	Azim.	Pol.	Ant. Ht meters	Elev. meters
2417	2317	XOJ435	NICOLET, QC	460452	721512	6M00	G7WDT	36.3	144	H	70	100
2417	2317	CHB581	ST ANTHONY, NEWFOUNDLAND	512056	553636	6M00	G7WDT	29.4	237.9	V	45	132
2417	2317	CGE936	SAINTE JOHN, NEW BRUNSWICK	451619	660346	6M00	G7WDT	24.9	39	H	80	20
2417	2317	VBU675	BREYNAT, ALBERTA	550824	1122718	1M60	D7WDT	29.1	110.7	H	91	579
2417	2317	VBU654	TUKTOYAKTUK, NWT	692409	1325725	5M00	D9DET	31.3	215	V	83	15
2417	2317	VEZ675	CALGARY, AB	510500	1140739	5M00	G9DET	33	276	V	49	1104
2417	2317	VAM487	MINNEDOSA, MB	501544	995018	6M00	G9WDT	30.2	138.3	V	70	572
2417	2317	VCU994	BIG WHITE, BC	494334	1185612	6M00	G7WDT	25.3	302.6	V	32	2000
2417	2317	XKU584	PETERBOROUGH, ONTARIO	441945	781803	5M00	D7WDT	30	259	H	67	213
2417	2317	XLB876	CAMPBELL MOUNTAIN, BC	493018	1193243	6M00	G7WDT	28.7	195.9	V	15	843
2417	2317	VBI708	AGASSIZ, BC	491500	1214448	6M00	G7WDT	27.8	216.9	H	40	280
2417	2317	VB1962	SICAMOUS, BC	505115	1185833	5M00	F7WDT	26	248.8	H	25	670
2417	2317	CZW302	HAINES JUNCTION, YT	604511	1373037	6M00	G7WDT	29.9	2.5	V	14	594
2417	2317	CZW338	CARCROSS, YT	600908	1344107	6M00	G7WDT	30.1	296.3	V	6	658
2417	2317	XLB653	WELLINGTON, B.C.	491250	1240012	5M00	G7WDT	29.3	330	V	55	160
2417	2317	CGE892	BLACK TUSK, B.C.	495905	1230322	6M00	G7WDT	19.4	25.6	V	80	1888
2417	2317	VDJ696	SEPT-ILES, QC	501246	662234	5M00	F8WXT	24.2	348	V	13	15
2417	2317	CFG823	OGILVIE RIVER, YT	653003	1381108	4M80	D7WET	33.7	30.9	H	14	1180
2417	2317	CFG821	DISTINCTA PEAK, YT	650031	1381532	4M80	D7WET	33.7	357.5	V	14	1636
2417	2317	CZW299	SOLOMON, YT	635205	1385705	4M80	D7WET	32.5	26	V	21	1231
2417	2317	CFG819	TOMBSTONE RIVER, YT	643130	1381256	4M80	D7WET	33	331.5	H	14	1310
2417	2317	CFG825	EHNJU CHOO CREEK, YT	661407	1365317	4M80	D7WET	33.7	24	V	14	817
2417	2317	CGE812	BURNABY, BC	491329	1225918	5M00	G7WDT	27.2	55.7	V	94	135
2417	2317	XKU580	CHATHAM, ONTARIO	422342	821253	5M00	D7WET	32.2	240.6	H	36	181
2417	2317	VBB816	RIVIERE HEVA, QC	481350	781643	6M00	G7WDT	25.9	12.6	H	28	381
2417	2317	VBB814	ROUYN, QC	481556	790205	6M00	G7WDT	25.1	101.7	V	41	351
2417	2317	XOJ678	JOLIETTE, QC	460125	732524	6M10	G7WXT	24.1	279.3	H	25	58
2417	2317	VBB710	MONT-BROME, QC	451720	723821	6M10	G7WXT	28.7	323.3	V	31	544
2417	2317	VBB708	MONT-SIR-WILFRID-LAURIER, QC	464112	753531	6M10	G7WXT	27.3	93.8	H	25	766
2417	2317	VBB707	ST-ZENON, QC	463420	734745	6M10	G7WXT	35	276.5	V	88	643
2417	2317	XOF795	SHERWOOD PARK, ALBERTA	532940	1131854	6M00	G9WDT	28.5	220.5	V	28	739

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2417	2317	XKP674	WHITECOURT MTN, AB	540154	1154303	6M00	G7WDT	28.4	302.8	V	23	1150
2417	2317	XKP640	SMOKY WELL, ALTA	542340	1181730	6M00	G7WDT	28.4	302.8	V	23	1189
2417.5	2317.5	VBU206	SHARPLES, ALBERTA	512840	1130328	1M60	D7WET	32.8	235.5	V	18	800
2422.25	2322.25	VEZ693	CALGARY, ALBERTA	510234	1140502	1M50	D7WDT	26.2	142.1	H	71	1030
2422.25	2322.25	VEZ695	VULCAN, ALBERTA	502247	1132209	1M50	D7WDT	23.8	161.3	V	60	1082
2423	2323	XOF795	SHERWOOD PARK, ALBERTA	532940	1131854	6M00	G9WDT	21.5	289.2	H	23	739
2423	2323	VBF635	ENTWISTLE, ALBERTA	533341	1150321	6M00	D7DDT	31.7	82	V	112	868
2423	2323	XOF800	DRAYTON VALLEY, ALBERTA	532340	1150225	6M00	G9WDT	28.1	117.8	V	85	853
2423	2323	XLB876	CAMPBELL MOUNTAIN, BC	493018	1193243	6M00	G7WDT	28.7	348.8	H	15	843
2423	2323	VBW904	PORT ALBERNI, BC	491500	1244808	6M00	G7WDT	26.3	218.2	H	12	16
2423	2323	VBY353	RADIUM HOT SPRINGS, BC	503723	1160708	6M00	G7WDT	25.9	141.7	H	20	975
2423	2323	VBH884	ADAMS HILL, BC	505408	1193821	5M00	G7WDT	30.7	144.8	V	27	1037
2423	2323	VBH883	FLY HILL, BC	504352	1192655	5M00	G7WDT	21.7	183.9	H	12	1753
2423	2323	CGE818	ABBOTSFORD, BC	490337	1222056	5M00	G7WDT	26.6	118	H	20	120
2423	2323	XKU501	BURLINGTON, ONTARIO	432139	795206	6M00	G7WDT	19	290.8	H	104	251
2423	2323	CGD988	CHICOUTIMI, QC	482258	710553	6M00	G7WDT	35.6	39.1	H	11	190
2423	2323	CGE892	BLACK TUSK, B.C.	495905	1230322	6M00	G7WDT	18.7	17.9	H	8	1888
2423	2323	VB1998	MT KOBALU, BC	490810	1194008	6M00	G7WDT	25.9	128.4	V	15	1862
2423	2323	VBW866	ROCKY MOUNTAIN HOUSE, ALBERTA	522004	1145352	6M00	G7WDT	31	73.2	H	90	1002
2423	2323	XOF797	POE, ALBERTA	531620	1122200	6M00	G9WDT	28.1	102.8	V	38	689
2423	2323	XOF795	SHERWOOD PARK, ALBERTA	532940	1131854	6M00	G9WDT	27.7	98.7	H	51	739
2423.75	2323.75	VBU676	ATHABASKA, ALBERTA	545452	1125131	3M20	D7WDT	25.9	159.5	H	15	572
2425.25	2325.25	VEZ695	VULCAN, ALBERTA	502247	1132209	1M50	D7WDT	25.1	163.7	H	30	1082
2425.25	2325.25	VEZ697	LETHBRIDGE, ALTA	494215	1125005	1M50	D7WDT	24.6	306.8	V	30	907
2429.5	2329.5	VBU205	WIMBORNE, ALBERTA	515425	1133538	1M60	D7WET	31.9	158.8	H	60	983
2429.5	2329.5	VBU203	DELACOUR, ALBERTA	510919	1134735	1M60	D7WET	28.8	226.1	V	75	1046
2430.75	2330.75	XLB882	SUMAS PEAK, BC	490707	1220752	3M50	G7WDT	30.8	293.9	H	30	899
2430.75	2330.75	XLB878	BOWEN ISLAND, BC	492043	1232309	3M50	G7WDT	31.8	88.2	V	15	334
2430.75	2330.75	XLB880	WHITE ROCK, BC	490231	1224900	3M50	G7WDT	32.3	343.9	V	39	120
2430.75	2330.75	VBG941	VANCOUVER, BC	491710	1230719	3M50	G7WDT	24.4	58.2	H	76	23
2430.75	2330.75	XLB881	SURREY, BC	490902	1224528	3M50	G7WDT	32.2	327.7	V	11	50

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2435	2335	VBH615	PENDER ISLAND, BC	484702	1231758	6M00	G7WDT	27.1	262.4	H	35	200
2435	2335	VBG961	LADYSMITH, BC	490116	1234921	6M00	G7WDT	23.4	141.1	H	40	169
2441.25	2341.25	XLB882	SUMAS PEAK, BC	490707	1220752	3M50	G7WDT	12.4	206.8	V	38	899
2441.25	2341.25	XLB879	BURNABY, BC	491600	1230112	3M50	G7WDT	16.5	26	H	8	20
2545.5	2315.5	CGO50	MILE 72, QC	492658	780713	10M00	G7WDT	26.2	272.1	H	20	317
2545.5	2315.5	CGE423	RANDAL, QC	511733	772108	10M00	G7WDT	34.1	273.3	V	71	84
2546.25	2316.25	VBY520	MT WABI, BC	554006	1213454	10M00	G7WDT	23	83.9	V	89	1006
2559	2329	VBH647	NEWCASTLE RIDGE, BC	502415	1260320	10M00	G7WDT	31.2	126.4	V	14	1295
2565	2335	VBW902	MT. HORNE, BC	491720	1244200	10M00	G7WDT	25	88.6	H	26	594
2567	2337	VBY671	HILL 4290, BC	551014	1205206	3M40	G7WDT	22.9	267.2	V	14	1308
2567	2337	VBY683	TUMBLER RIDGE, BC	550210	1205841	3M40	G7WDT	25.1	323.8	V	19	914
2567	2337	VBY670	THUNDER MOUNTAIN, BC	545715	1203530	3M40	G7WDT	30.2	303.9	H	19	1478
2567	2337	VBY674	WEST SUKUNKA, BC	551311	1214013	3M40	G7WDT	11.5	352.8	H	44	713
2567	2337	VBY684	HERMAN MTN, BC	545942	1210713	3M40	G7WDT	29.5	356.5	V	5	1685
2574	2344	VBY690	BRAZION CREEK, BC	552140	1215822	3M40	G7WDT	17	290.9	V	20	1372
2574	2344	VBY679	NORTH GRIZZLY, BC	545339	1203959	3M40	G7WDT	23.9	151.3	V	33	1109
2574	2344	VBY682	RED WILLOW, BC	545153	1203019	3M40	G7WDT	26.8	220.9	V	19	1096
2574	2344	VBY672	BULLMOOSE CREEK, BC	551335	1212401	3M40	G7WDT	-9.1	202.6	V	29	1423
2574	2344	VBY672	BULLMOOSE CREEK, BC	551335	1212401	3M40	G7WDT	25.3	113	H	47	1423
2574.25	2344.25	CFG845	FRIEDENS FARM, BC	563049	1215143	3M50	G7WDT	24	263	V	18	691
2574.25	2344.25	CFG847	NEW INDIAN RESERVE, BC	563049	1215752	3M50	G7WDT	24.1	256	V	15	632
2574.25	2344.25	CFG848	MACCABEE FARM, BC	563030	1215955	3M50	G7WDT	18.4	257	V	18	627
2574.25	2344.25	CFG846	ALBERT SCHOLL, BC	563144	1215550	3M50	G7WDT	19.1	248.7	V	11	686
2581	2351	VBY690	BRAZION CREEK, BC	552140	1215822	3M40	G7WDT	37.2	95.7	V	29	1372
2581	2351	VBY684	HERMAN MTN, BC	545942	1210713	3M40	G7WDT	-0.4	192.6	V	5	1685
2581	2351	VBB969	LAC DES GRANDES POINTES, QC	490918	712743	3M40	G7WDT	29.4	14.9	V	30	624
2581	2351	VBB969	LAC DES GRANDES POINTES, QC	490918	712743	3M40	G7WDT	14.6	257	V	18	624
2581	2351	VBY674	WEST SUKUNKA, BC	551311	1214013	3M40	G7WDT	23	2.3	V	43	713
2581	2351	VBY672	BULLMOOSE CREEK, BC	551335	1212401	3M40	G7WDT	30.8	308.7	H	47	1423
2581	2351	VBY676	CHAMBERLAIN, BC	550919	1213900	3M40	G7WDT	27.8	358.4	V	24	1615
2581	2351	VBY688	HIGH HAT, BC	552242	1214812	3M40	G7WDT	20.5	112.7	V	34	988

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2581.25	2351.25	CFG831	COLT CREEK, BC	562931	1222317	3M50	G7WDT	9.7	0	V	55	1072
2581.25	2351.3	CFG908	ZEKE, BC	565718	1212509	3M50	G7WDT	8.5	0	V	46	859
2602	2341	VX9NVP	WINNIPEG, MB	494828	970807	6M00	D7WDT	34.5	0	H	30	233
	2360	VBM825	SUFFIELD, ALBERTA	501730	1110717	14M60	F8FNN					770
	2360	CYN802	SUFFIELD, ALBERTA	501730	1110717	14M60	F8FNN					770
	2360	XNN793	SUFFIELD, ALBERTA	501730	1110717	14M60	F8FNN					770
	2360	VAA479	COLD LAKE, ALBERTA	544439	1100229	4M07	F1DXX					709
	2356	VAA479	COLD LAKE, ALBERTA	544439	1100229	4M07	F1DXX					709
	2355	VBB769	TRANSPORTABLE, QC	454106	735553	6M80	DIADN					60
	2353	VAF664	SAINT LAURENT, QC	453038	734453	850kHz	F1EJN					30
	2352	VAA479	COLD LAKE, ALBERTA	544439	1100229	4M07	F1DXX					709
	2348	VAA355	SUFFIELD, ALBERTA	501600	1111200	500kHz	F9W					770
	2348	VAA211	GAGETOWN, NB	454905	662530	500kHz	F9W					170
	2345	VAA355	SUFFIELD, ALBERTA	501600	1111200	500kHz	F9W					770
	2345	VAA211	GAGETOWN, NB	454905	662530	500kHz	F9W					170
	2323	VBF635	ENTWISTLE, ALBERTA	533341	1150321	6M00	D7DDT					868
	2317	XKU580	CHATHAM, ONTARIO	422342	821253	5M00	D7WET					181
	2317	XKP957	PARKLAND, ALBERTA	501458	1134200	6M00	D7WET					1097
2330		mobile	SUFFIELD, ALTA	501600	1111200	1M50	F1D	5				
2345		mobile	GAGETOWN, NB	454905	662530	500kHz	F9W	2				
2345		mobile	SUFFIELD, ALTA	501600	1111200	500kHz	F9W	2				
2348		mobile	SUFFIELD, ALTA	501600	1111200	1M50	F1D	5				
2348		mobile	GAGETOWN, NB	454905	662530	500kHz	F9W	2				
2348		mobile	SUFFIELD, ALTA	501600	1111200	500kHz	F9W	2				
2351.5		mobile	ARCTIC COAST, NWT	440000	790000	6M00	G7DXX	80				
2353		mobile	SAINT LAURENT, QC	453038	734453	850kHz	F1EJN	2				
2355		mobile	TRANSPORTABLE, QC	454106	735553	6M80	DIADN	20				
2357.5		mobile	ARCTIC COAST, NWT	440000	790000	6M00	G7DXX	80				
2360		mobile	SUFFIELD, ALTA	501600	1111200	14M60	F8FNN	10				
2360		mobile	SUFFIELD, ALTA	501600	1111200	14M60	F3F	10				