

FM AND TV BROADCASTING IN THE CANADIAN AND MEXICAN BORDER AREAS

COMPLYING WITH THE NEW AGREEMENTS

Robert D. Weller, P.E.
Hammett & Edison, Inc.
Consulting Engineers
San Francisco

Abstract

New agreements between the United States and Mexico concerning FM Broadcasting and between the U.S. and Canada concerning TV Broadcasting went into force in 1994. Changes to other existing agreements and treaties between the U.S., Canada, and Mexico have occurred in the past several years. Failure of U.S. stations to consider the implications of the various treaties often results in applications being returned or processing delayed. The most current requirements of these various documents are reviewed and compared with FCC requirements.

INTRODUCTION

Broadcasters near the Canadian and Mexican borders are subject to bilateral or multilateral treaties, in addition to the rules of their own nation's regulatory agencies. The technical provisions of these treaties are often different from those specified in either of the respective government's regulations. Proposals that are not in compliance with applicable treaties may require special handling, such as notification or coordination between the governments concerned.

In the U.S., applications requiring international notification or coordination are to be avoided, since such applications are typically held by the FCC until a threshold quantity is reached, before being forwarded to the other administration for consideration. This procedure can tie up applications literally for years. An understanding of the various agreements is important to ensure expedient processing of applications.

TERMINOLOGY

The term "treaty" is both generic and specific. As a generic term, it refers to an international agreement "governed by international law, whether embodied in a single instrument or in two or more related instruments and whatever its particular designation."¹ In the United States, its restricted (specific) meaning denotes "international agreements made by the President with the advice and consent of the Senate."²

Most treaties affecting U.S. broadcasters are not treaties under the restricted definition. They are actually "Executive Agreements," meaning that they have been concluded by the Executive branch of the U.S. Government pursuant to or in accordance with existing legislation or a prior treaty, in accordance with the President's Constitutional powers. Agreements are typically signed by the ambassadors of the countries involved or, on behalf of the U.S., by an Office Director within the Department of State.

The details of the agreement or treaty are implemented in non-binding documents known as "working arrangements." These are typically negotiated and approved at the staff level. A list of treaties, agreements, and working arrangements related to FM and TV broadcasting that are presently binding on the U.S. appears as Figure 1.

<p style="text-align: center;">Agreements with Canada</p> <p>Agreement Relating to the FM Broadcasting Service and the Associated Working Arrangement (1991) Agreement Relating to the TV Broadcasting Service (1994)</p> <p style="text-align: center;">Agreements with Mexico</p> <p>Agreement Relating to the FM Broadcasting Service in the Band 88-108 MHz (1994) Agreement Relating to the Assignment and Use of Television Channels (1962) Amended 1975, 1979, 1980, 1982, 1984, and 1988 Agreement Relating to Assignments and Usage of Television Broadcasting Channels in the Frequency Range 470-806 MHz (Channels 14-69) (1982) Amended 1985 and 1988</p>

Figure 1. Listing of Agreements relating to FM or TV Broadcasting between the United States and Canada or Mexico.

THE FM AGREEMENTS

U.S.-Canada

The “Agreement between the Government of Canada and the Government of the United States of America Relating to the FM Broadcasting Service and the Associated Working Arrangement” became effective in February 1991, replacing an earlier agreement that had been in force since 1947. It is expected that some stations, which had been authorized under the original 1947 agreement (and before the 1984 working arrangement that amended it) would be able to improve their coverage under the 1991 agreement.

The working arrangement for the 1991 agreement is virtually identical to the 1984 working arrangement and applies to allotments and assignments within 320 km of the mutual border, affecting the 22 states of Alaska, Connecticut, Idaho, Indiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Montana, New Hampshire, New Jersey, New York, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, Vermont, Washington, West Virginia and Wisconsin. Five station classes are specified, as shown in Figure 2.

Spacing between stations is calculated using spherical Earth calculations, which express the number of kilometers as a function of latitude and longitude. The calculations reduce the spherical trigonometric functions to their power series identities, using the now obsolete Clarke ellipsoid of 1866, truncating the power series at two terms and introducing

a “fudge” factor to define conversion of miles to kilometers. These calculations yield approximate, but incorrect, values.³

For stations exceeding the maximum height above average terrain specified for their station class, coverage equivalence is obtained by power reduction to prevent extension of the distance both to the 60 dBu F(50,50) class contour and to the appropriate interfering F(50,10) contour.

Limited (*i.e.*, short-spaced) assignments are permitted, provided there is no prohibited contour overlap. As in the FCC’s Rules, the determination of prohibited overlap involves projection of protected and interfering contours from the existing and proposed stations, respectively. Unlike FCC Rules, the median (F(50,50)) field strength value for the protected contour is always 54 dBu, except for Class C stations, where it is 58 dBu. The interfering contour is projected with the F(50,10) curves, using desired-to-undesired (“D/U”) ratios of 20, 6, -20, and -40 dB for co-channel, first-, second-, and third-adjacent channel assignments, respectively. The -20 dB D/U ratio required for second-adjacencies is considerably more restrictive than the present FCC requirement of -40 dB for commercial stations,⁴ but identical to the present requirement for non-commercial educational stations.⁵ Contour overlap need only be considered for land areas on the side of the border where the proposed station is located. That is, trans-border interference potential need not be considered. Additionally, zones lying entirely over water

Class Relation	Canada					Mexico			
	Co-Channel 0 kHz	Adjacent Channels			I.F. 10.6/10.8	Co-Channel 0 kHz	Adjacent Channels		I.F. 10.6/10.8
		200 kHz	400 kHz	600 kHz			200 kHz	400/600 kHz	
A - A	132 km*	85 km	45 km	37 km	8 km	100 km*	61 km*	25 km	8 km
A - AA	not applicable					111	68	31	9
A - B1	180	113	62	54	16	138	88	48	11
A - B	206*	132*	76	69	16	163*	105	65	14*
A - C1	239*	164	98*	90*	32	196	129	74	21
A - C	242	177*	108*	100*	32	210	161*	94*	28*
AA - AA	not applicable					115†	72†	31†	10
AA - B1	not applicable					143†	96†	48†	12
AA - B	not applicable					178†	125†	69†	15
AA - C1	not applicable					200†	133†	75†	22
AA - C	not applicable					226†	165†	95†	29
B1 - B1	197†	131†	70†	57†	24†	175†	114†	50†	14
B1 - B	223†	149†	84†	71	24†	211†	145†	71†	17
B1 - C1	256†	181†	106†	92†	40†	233†	161†	77†	24
B1 - C	259	195†	116†	103	40†	259†	193†	96†	31
B - B	237*	164*	94†*	74*	24†	237†*	164†*	65†	20*
B - C1	271†*	195*	115†*	95†*	40†	270†	195†	79†	27
B - C	274	209*	125†*	106†*	40†	270	215†	98†*	35*
C1 - C1	292†*	217†*	134†*	101†*	48†	245	177	82	34
C1 - C	302†*	230†*	144†*	111†*	48†	270	209	102	41
C - C	306†	241*	153†*	113†*	48	290†	228†*	105	48

* separation distance less than required in old Agreements.

† separation distance greater than required in Part 73

Figure 3. Summary of FM Station spacing requirements under the U.S.-Canada and U.S.-Mexico Agreements.

Contour Protection for Short-Spaced Assignments. The most significant change associated with the new Agreement is the provision of “restricted allotments,” which do not meet the spacing requirements. Power reductions and/or directional antennas can now be used to afford equivalent interference protection to existing facilities or allotments, in much the same way as Section 73.215 of the FCC Rules. This provision should allow many stations in the border area to increase their coverage.

In determining the required contour protection, field strength values are calculated

in a manner similar to that specified in FCC Rules. Protected and interfering contours are projected at field strength levels appropriate for the classes of station involved. The protected contour is based on an F(50,50) value; interfering contours are based on F(50,10) values. The protected and interfering contour field strength values to be used are the same as those specified in Section 73.215.

Only the eight standard radials may be used for determining HAAT. When it is necessary to protect an assignment that is not along one of those radials, one must interpolate linearly

between the two standard radials adjacent to the actual azimuth. Azimuths and distances are reported to the nearest degree and kilometer, respectively, but rules for rounding are not given. F(50,10) values resulting in distances of less than 15 km default to F(50,50) values. Values of HAAT less than 30 meters are replaced with 30 meters.

Translators. As with the Canadian Agreement, translators in the Mexican border area are considered LPFM stations. Although detailed technical requirements are specified, international notification is always required for FM translators within 320 km of the border.

THE TV AGREEMENTS

U.S.-Canada

The current "Working Arrangement for Allotment and Assignment of VHF and UHF Television Broadcast Channels under the Agreement between the Government of the United States of America and the Government of Canada Relating to the TV Broadcasting Service" is dated March 1, 1989, but did not become effective until January 5, 1994. Allocations and assignments within 400 km of the border are affected. Two zones are defined: "Zone I," which is identical to the Zone I defined in Section 73.609(a)(1) of the FCC Rules, plus a portion of Canada, which includes the major cities of Ottawa, Montréal, and Québec, and "Zone II," which includes all border areas outside of Zone I.

This and the previous agreements define "standard parameters," which are similar to the FCC maximum parameters at VHF within Zone I, but are significantly different at UHF and outside of Zone I. The limitations imposed by the standard parameters limited many UHF TV stations in the border area to 1,000 kW ERP. The new Agreement defines "maximum parameters," which are nearly identical to the maximum ERPs specified in the FCC Rules, but derating equivalence is

determined from the distance between allotments and assignments, rather than the formulas involving HAAT used in FCC Rules.

Average terrain is calculated using the standard eight radials, at distances from 3 to 16 km from the antenna, rather than the 3.2-16.1 km specified in the FCC Rules. Channel protection (including adjacencies and the UHF "taboos," where appropriate) is based on distance separations, which are generally slightly less than those required under FCC Rules. In addition to the minimum mileage separations, lack of prohibited contour overlap must also be demonstrated for stations separated by less than a specified distance. As with the FM Agreement, trans-border interference potential is not considered, since protected contours are assumed to stop at the border.

Maximum distances to the protected contour are specified but do not apply for LPTV assignments. Specification of the maximum distance often has the effect of truncating the contour. Low Power Television ("LPTV") operation is permitted on a secondary (non-interference) basis.

U.S.-Mexico

TV stations operating near the Mexican border are subject to different agreements and working arrangements, depending upon whether they are VHF or UHF, full-service or low-power.

VHF Stations. The current "United States-Mexico VHF Television Agreement" became effective April 18, 1962. As with Canada, allocations and assignments within 400 km of the border are affected. Maximum parameters are identical to the maximum ERP specified in the FCC Rules for VHF low-band channels (*i.e.*, 100 kW), but are 0.1 dB higher for VHF high-band channels (*i.e.*, 325 kW vs. 316 kW). ERPs are calculated in the horizontal plane, rather than toward the radio horizon or in the plane of maximum radiation.

VHF TV Stations			
<u>Maximum ERP</u>	<u>Maximum HAAT</u>	<u>Minimum Distance* from Border</u>	<u>Equivalent 52 dBu[†] Service Radius</u>
10 W	600 m	60 km	26.5 km
20	300	60	20.9
50	200	60	21.5
50	600	90	38.9
200	400	90	41.4
500	300	90	43.3
1,000	200	90	42.3
500	1,000	140	70.8
1,000	500	140	61.3

* 52 dBu is the average Grade B signal level for VHF TV stations.
[†] Distance is average of F(50,50) values for low and high-VHF curves.

UHF TV Stations		
<u>Maximum ERP</u>	<u>Minimum Distance from Border</u>	<u>Equivalent HAAT* for 36 dBu interfering signal</u>
0.1 kW	40 km	100 m
1	60	100
10	100	100

* 36 dBu is the appropriate F(50,10) field strength to preclude interference to full-service UHF TV stations, assuming offset operation.

Figures 4A and 4B. Summary of operating parameter limits versus distance from the U.S.-Mexico border.

There is no power derating requirement for VHF stations at high sites. Assignments are based strictly on distance separation criteria. For the area along the border with West Texas shown in Figure 5, co-channel assignments must be 355 km apart. In all other areas, 305 km is required. For adjacent-channel operation 100 km is required in all cases.

For LPTV operation on VHF channels, the September 14, 1988 amendment applies. LPTV operations are on a secondary, non-interference basis. Operation can be authorized without international negotiation if the proposal is at least 60 km from the border, subject to height and ERP limitations. Permitted operations (not requiring international coordination) are summarized in Figure 4A.

HAAT is calculated along radials from 3 to 16 km, but the number of radials is not

specified. ERP is calculated in the horizontal plane along the azimuths toward the border area, so judicious choice of azimuth and elevation antenna patterns can yield very effective LPTV facilities that still comply with the agreement.

UHF Stations. At UHF, a 1982 Agreement replaced the former 1958 Agreement. Assignments within 320 kilometers of the border are affected. As with the Canadian Agreement, ERP is limited to 5,000 kW, but only power in the horizontal plane is considered. Maximum power facilities are permitted at locations up to 610 meters above average terrain, with the average terrain calculated along radials from 3.2 to 16 km. A chart is used to determine the maximum ERP at greater heights, but the results are virtually identical to the power derating formula given in Section 73.614(b)(5) of the FCC Rules.

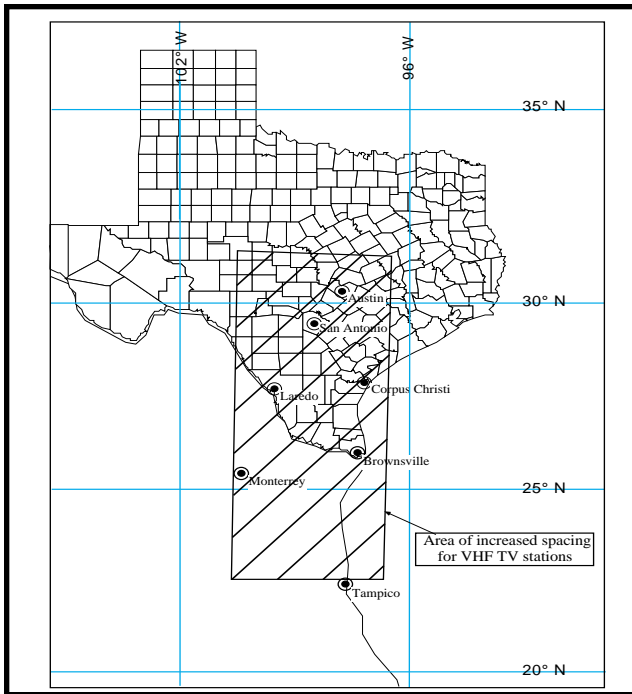


Figure 5. Map of area requiring increased spacing for co-channel full-service VHF TV Stations.

SUMMARY

FM and TV broadcasters in the Canadian and Mexican border areas are subject to the requirements of various bilateral treaties. FM stations within 320 km of either border are affected. TV stations within 400 km of either border are affected, except that this distance is decreased to 320 km for UHF TV stations near the Mexico border.

The technical definitions used in the treaties vary, and an in-depth understanding of them can frequently allow coverage improvements.

- 1 U.S. Department of State, Treaties in Force
- 2 *ibid.*
- 3 Comments of Hammett & Edison, FCC Mass Media Docket 86-144, June 6, 1986.
- 4 47 CFR §73.215(a)(2).
- 5 47 CFR §73.509(a).

For LPTV operation, both the 1982 Agreement and the October 19, 1988, amendment apply. Interference to full-service stations or land mobile assignments is not permitted. Operation can be authorized without international negotiation if the proposal is at least 40 km from the border, subject to ERP and HAAT limitations. Permitted operations (not requiring international coordination) are also shown in Figure 4B.

Unlike full-service stations, HAAT for UHF LPTV stations is calculated along radials from 3 to 16 km, but the number of radials is not specified. ERP is calculated in the horizontal plane along the azimuths toward the border area, so judicious choice of azimuth and elevation antenna patterns can also yield very effective LPTV facilities that still comply with the Agreement.

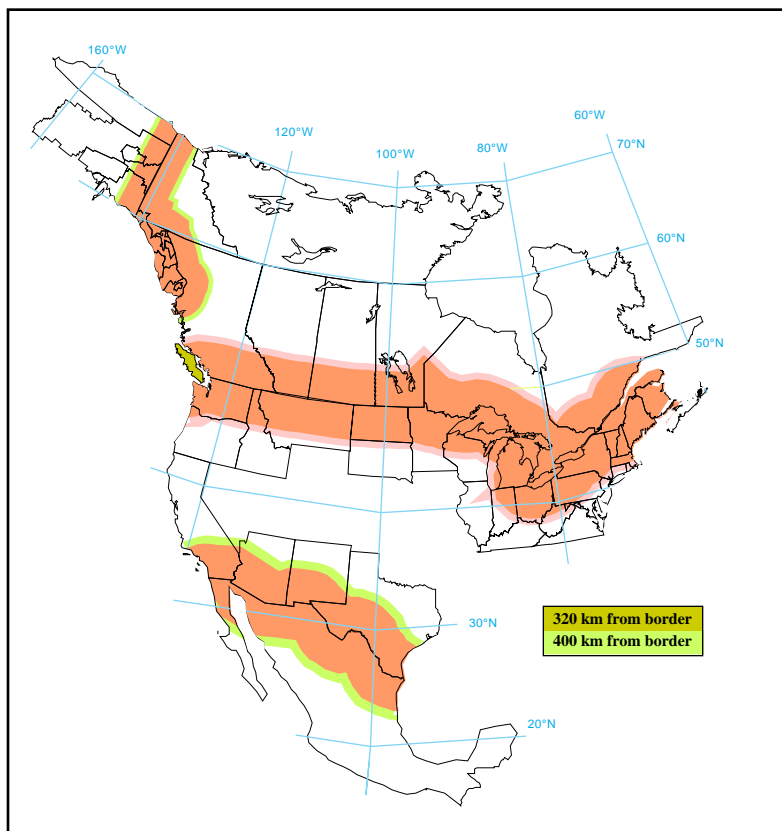


Figure 6. Map of areas affected by Canadian and Mexican FM and TV Agreements.