



Saving Lives and Property Through Improved Interoperability

***Public Safety Radio Frequency Spectrum
Digital Television
Transition Status Update***

FINAL

January 2002

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1. INTRODUCTION

Public safety agencies cannot do their job effectively without sufficient radio spectrum. Spectrum access is essential to those who protect lives and property on a daily basis. However, spectrum is a premium commodity, costing commercial companies millions of dollars to obtain. Because obtaining funding to meet this high cost is often impossible for public safety agencies, they are unable to buy spectrum and must rely on new allocations to support their expanding mission requirements.

In September 1996, in its final report to the Federal Communications Commission (FCC) and the National Telecommunications and Information Administration (NTIA), the Public Safety Wireless Advisory Committee (PSWAC) identified the need for additional spectrum as a critical public safety requirement. The PSWAC concluded that to meet the demands placed on public safety communications, an additional 97.5 megahertz (MHz) of spectrum would be required by 2010. Pursuant to the Balanced Budget Act of 1997 (BBA 97), the FCC partially responded to these recommendations by allocating 24 MHz of spectrum to public safety. Although this 24 MHz was a good start toward satisfying the need for additional spectrum, the broadcasters that currently use that spectrum are not scheduled to vacate it until December 2006. Furthermore, it is unlikely the digital television (DTV) transition will be complete by that date, and by then, the public safety's spectrum needs will have increased significantly. Specifically, public safety agencies' mission requirements will increase as they implement new technologies and applications, particularly for video and data that now can aid public safety operations. This expanded mission and the tools necessary to support new capabilities demand increased bandwidth that public safety can only acquire through the immediate availability of spectrum.

The 24 MHz of spectrum reallocated to public safety by the BBA 97 is currently in the television broadcast band (Channels 63, 64, 68, and 69). Its availability and use is contingent on the relocation of television broadcast stations to channels below 52 as part of the transition from analog to DTV. While this transition is currently in motion, other factors will also affect the public safety community's use of this new spectrum.

This document updates the Public Safety Wireless Network (PSWN) Program's DTV report published in March 2001, entitled *Public Safety Radio Frequency Spectrum: Digital TV Transition Status*, and provides the status of current issues impacting public safety's use of the newly allocated 24 MHz of spectrum. It makes no judgment regarding decisions or events that have influenced the DTV transition currently in progress.

2. ISSUES AND CONCERNS

This section updates issues and concerns associated with public safety’s access to the 24 MHz of spectrum allocated by the FCC pursuant to the BBA 97, specifically the effects of the DTV transition on the use of this spectrum.

2.1 The DTV Transition

The FCC reallocated 24 MHz of television broadcast spectrum, encompassing TV channels 63–64 (764–776 MHz) and TV channels 68–69 (794–806 MHz) to public safety, contingent on the DTV transition achieving specific milestones defined in the BBA 97.¹ The transition to DTV is scheduled for completion at the end of 2006.

2.1.1 Criteria and Milestones

The FCC developed an ambitious milestone schedule that provides for the needs of the current broadcast users and protects them from unreasonable costs. The following timeline was established to map progress of the transition.

Year	Date	Milestone	Status
1996	September	PSWAC Report released ²	N/A
1997	April	FCC establishes DTV service rules and issues DTV assignment/allotment tables ³	Complete
1998	January	FCC reallocates TV channels 60–69 for other than broadcast services ⁴	Complete
1998	September	FCC to start issuing licenses to public safety agencies in reallocated spectrum ⁵	Missed ⁶
1999	May	Four major network affiliates to be “on the air” in top 10 markets	Missed ⁷
1999	November	Four major network affiliates to be “on the air” in top 30 markets	Extended ⁸
2000	July	DTV-compatible set-top and cable boxes to be available	Available
2001	September	PSWAC Study indicated that 25 MHz of additional spectrum would be needed 5 years after the study, none of which is available from the spectrum recovery for DTV at this time	Missed
2002	April	All remaining commercial DTV stations to be “on the air”	Pending
2003	April	All DTV licensees must simulcast 50 percent of their analog content on DTV	Pending
2003	May	All noncommercial stations to be on “on the air”	Pending
2004	May	All DTV licensees must simulcast 75 percent of their analog content on DTV	Pending
2005	April	All DTV licensees must simulcast 100 percent of their analog content on DTV	Pending
2006	December	DTV transition scheduled for completion. After December 31, 2006, DTV stations may continue operations on channels 60–69 until they can move to a channel in the core TV spectrum, or until their license (8-year term) expires	Pending
2010		PSWAC Report indicates that a total of 97.5 MHz will be needed for public safety use	Not Expected ⁹

The conditions listed below were established as fail-safe ways to ensure that broadcast television users were not denied television service as a result of the transition. The DTV Allotment Plan assigns specific channels for each station that will be broadcasting DTV in the United States.

Public Law 105-33, Section 3004, states that in markets with insufficient DTV services, analog television may continue to operate after December 31, 2006, under any of the following conditions:

- If one of the four major network affiliates (i.e., ABC, CBS, FOX, or NBC) has not constructed a digital television station
- If digital-to-analog converters are not available
- If less than 85 percent of households do not have at least one television capable of receiving digital service (i.e., DTV set, set-top box, or cable service).

The FCC reserved the right to move analog or digital television stations into channels 60–69 for the duration of the DTV transition. In very congested areas, this right has already been exercised.

Stations Assigned a DTV Channel in the Public Safety Band	
Concord, California	Channel 63
Riverside, California	Channel 68
Philadelphia, Pennsylvania	Channel 64
Mayaguez, Puerto Rico	Channel 63
Aguadilla, Puerto Rico	Channel 69

2.1.2 Transition Progress

As of December 12, 2001, of the 1,688 allotments in the DTV table, 1,415 facilities, or 84 percent, have been granted construction permits or licenses. There are a total of 223 stations on the air with DTV operation. The remaining applications have been processed and are awaiting additional information: Mexican, Canadian, or other clearances; or are mutually exclusive.¹⁰

In the top 10 television markets, the top 4 affiliates have made progress as presented in the table below:

Top 10 Market	
Total Stations in the Top 10 Market	40
Total DTV "On-the-Air"	37
Percentage DTV "On-the-Air"	92.5%

(NOTE: Two of the stations that were on the air went off the air when the World Trade Center was destroyed.)

The following table presents the progress achieved in the top 11–30 markets:

Top 11–30 Markets	
Total Stations in the Top 11-30 Market	79
Total DTV "On-the-Air"	73
Percentage DTV "On-the-Air"	92.4%

The tables below indicate broadcast stations within the newly allocated public safety bands, as well as those operating on adjacent channels. These tables demonstrate that the newly allocated spectrum is currently available in many areas. Public safety communications planners can use this information to support current planning, funding, and systems implementation within their areas of responsibility.

TV Stations in Public Safety Bands by State				
State	CH63	CH64	CH68	CH69
Alabama	0	0	1	0
California	1	2	1	1
Delaware	0	1	0	0
Florida	1	0	1	1
Georgia	1	1	0	1
Illinois	0	0	0	0
Indiana	2	0	0	1
Iowa	0	0	0	6
Kentucky	0	0	1	0
Maryland	0	0	1	0
Massachusetts	0	0	1	0
Michigan	0	1	0	0
New Jersey	1	0	1	0
New York	0	0	1	0
North Carolina	0	1	0	0
Ohio	0	1	1	0
Pennsylvania	0	1	0	1
Puerto Rico	0	1	1	0
Rhode Island	0	1	0	1
South Carolina	1	0	0	0
Texas	0	0	1	0
Virginia	0	0	1	0

TV Stations in Adjacent Public Safety Bands by State			
State	CH62	CH65	CH67
California	1	1	1
Connecticut	0	1	0
Florida	1	1	1
Kentucky	0	1	1
Louisiana	0	0	0
Maryland	1	0	1
Massachusetts	1	0	0
Michigan	1	0	0
New Jersey	0	1	0
New York	1	0	2
North Carolina	2	0	0
Ohio	0	0	1
Oklahoma	1	0	0
Texas	1	1	1
Virginia	0	1	0

To provide flexibility in the voluntary clearing of the upper 700 MHz band, and acknowledging strong public interest benefits favoring comprehensive band-clearing agreements,

the FCC modified its policies to facilitate development of voluntary band-clearing arrangements between incumbent broadcasters and new commercial wireless interests. In particular, the FCC granted petitioners' requests to allow a broadcaster that gives up one of its channels to accommodate band clearing the flexibility to continue to operate in analog mode. That broadcaster could then convert to DTV at any time up until December 31, 2005, and seek further extension of the DTV construction deadline if less than 70 percent of the television households in its market were capable of receiving DTV signals. The FCC also granted such broadcasters limited relief from DTV policies regarding interference protection of nonreplicated service areas, and established a 90-day processing timeline for modification applications filed in connection with band-clearing arrangements.¹¹

On October 11, 2001, FCC Chairman Michael Powell announced the creation of an FCC DTV Task Force to review the ongoing transition to DTV and to make recommendations to the Commission concerning priorities to facilitate the transition and promote the rapid recovery of broadcast spectrum for other uses. The Task Force will help reexamine the assumptions on which the Commission based its DTV policies and give it the ability to react and make necessary adjustments.¹²

As indicated in Section 2.1.1 above, analog television may continue to operate after December 31, 2006, under certain conditions. On December 4, 2001, Representative Jane Harman (California) introduced a bill (HR3397) to provide for the expedited and increased assignment of spectrum for public safety purposes. If enacted, the Act would be cited as the "Homeland Emergency Response Operations Act" or the "HERO Act." The bill proposes that Section 309(j) of the Communications Act of 1934 be amended. The proposed amendment prohibits the FCC from granting any extensions for analog television service for channels 63, 64, 68, and 69 beyond December 31, 2006. It also requires the FCC to take all actions necessary to complete assignment of the electromagnetic spectrum between 764–776 MHz and 794–806 MHz for public safety services and to permit public safety services on those frequencies commencing no later than January 1, 2007. Cosponsors of the bill are Representatives Ballenger (North Carolina), DeGette (Colorado), Frelinghuysen (New Jersey), Gekas (Pennsylvania), Gilman (New York), Grucci (New York), Hart (Pennsylvania), Hayes (North Carolina), Israel (New York), Jones (North Carolina), Kerns (Indiana), McIntyre (North Carolina), LoBiondo (New Jersey), Moran (Virginia), Thompson (California), and Weldon (Pennsylvania).

2.2 Border Agreements

This section discusses agreements between the United States, Canada, and Mexico for implementation of DTV along the common borders. Although the 746–806 MHz frequency band is allocated to the broadcast service internationally, Canada, Mexico, and the United States have received International Telecommunication Union (ITU) approval for an additional allocation to the fixed and mobile services (international footnote S5.293).¹³

2.2.1 United States/Mexico Border Area

On July 31, 1998, the FCC announced that a Memorandum of Understanding (MOU) had been signed with Mexico's Secretariat of Communications and Transportation. The MOU established procedures for implementing DTV service along the United States/Mexico border and approved all DTV stations in the United States/Mexico border area. These stations are

located in the Los Angeles area, the only Top 10 market located within the United States/Mexico border zone.

The MOU provides an expedited notification process through which most authorized DTV stations can begin operation within 15 days of notification to the other country.

The MOU, which covers DTV operations in the area extending 275 kilometers on either side of the United States/Mexico common border, contains the following major provisions:¹⁴

- A list of mutually acceptable second channel DTV allotments for each country
- Procedures for notifying each administration of plans to implement DTV service relative to an allotment
- The methods to be used by each administration in evaluating the acceptability of proposed DTV facilities
- Lists of National Television System Committee (NTSC) channel allotments
- Lists of each country's accepted DTV facilities

The tables below show those allotments agreed to by the United States and Mexico that are within public safety spectrum or adjacent to that spectrum.

United States NTSC Television Allotments¹⁵ Within or Adjacent to Public Safety Spectrum (Within 275 Kilometers of the United States/Mexico Border)				
State	City	Latitude	Longitude	Channel
California	Barstow	343634	1171711	64
California	Oxnard	341951	1190122	63
California	Riverside	341116	1174155	62
California	San Diego	324147	1165607	69
Texas	El Paso	314855	1062917	65

Mexico NTSC Television Allotments¹⁶ Within or Adjacent to Public Safety Spectrum (Within 275 Kilometers of the United States/Mexico Border)				
State	City	Latitude	Longitude	Channel
COA	CD. Acuna	291741	1005404	64
SON	Caborca	304338	1120915	63

United States Digital Television Allotments¹⁷ Within or Adjacent to Public Safety Spectrum (Within 275 Kilometers of the United States/Mexico Border)				
State	City	Latitude	Longitude	Channel
California	Los Angeles	341329	1180347	65
California	Riverside	341116	1174155	68

Mexico Digital Television Allotments¹⁸ Within or Adjacent to Public Safety Spectrum (Within 275 Kilometers of the U.S./Mexico Border)				
State	City	Latitude	Longitude	Channel
Baja California	Mexicali	323930	1152905	64
Baja California	Mexicali	323641	1152939	65

Mexico Digital Television Allotments¹⁸				
Within or Adjacent to Public Safety Spectrum				
(Within 275 Kilometers of the U.S./Mexico Border)				
Baja California	Mexicali	323641	1152939	67
Coahuila	Nueva Rosita	275615	1011335	65
Coahuila	Saltillo	252637	1005922	69
Tamaulipas	Metamoros	255219	973010	63*
Tamaulipas	Nuevo Laredo	272645	993027	62
*Special negotiated mutually accepted short-spaced allotment.				

2.2.2 United States/Canada Border Area

On September 29, 2000, the FCC announced that then-FCC Chairman Kennard, and Michael Binder, Industry Canada Assistant Deputy Minister, had signed a Letter of Understanding (LOU) regarding the introduction of DTV service along the United States/Canada border.¹⁹

The LOU covers DTV operations within 400 kilometers on either side of the United States/Canadian border. The LOU contains a table of mutually acceptable DTV channel allotments (see table below for Canada's list) for each country and the procedures each country will use in notifying and evaluating proposed DTV facilities. An LOU between the United States and Canada was necessary because the prior agreement, which remains in effect, covers only analog television service.

Canadian NTSC and DTV Allotments²⁰					
Within or Adjacent to Public Safety Spectrum					
(Within 400 Kilometers of the United States/Canada Border)					
NTSC CH	DTV CH	City/Ville	Province	Latitude	Longitude
5	67	Kelowna	British Columbia	495800	1193140
6	68	Victoria	British Columbia	484628	1231010
3	62	Allardville	New Brunswick	472239	652623
9	69	Campbellton	New Brunswick	480458	663453
11	67	Moncton	New Brunswick	460841	645414
4	62	Saint John	New Brunswick	452839	661402
12	69	Saint John	New Brunswick	452840	661403
3	63	Halifax	New Brunswick	443903	633928
4	65	New Glasgow	New Brunswick	453200	623814
66	62	Brighton	Ontario	440237	774740
48	63	Chatham	Ontario	422700	820500
64	65	Chatham	Ontario	422700	820500
7	67	Elliot Lake	Ontario	462316	823716
2	64	Kearns	Ontario	480807	793319
32	63	Kingston	Ontario	441722	762850
38	64	Kingston	Ontario	441722	762850
11	69	Kingston	Ontario	441002	762540
56	67	Kitchener	Ontario	431539	802639
2	64	North Bay	Ontario	461810	792440
6	69	North Bay	Ontario	460346	792605
9	62	Ottawa	Ontario	453011	755102
65	67	Ottawa	Ontario	451301	753351
43	68	Ottawa	Ontario	451301	753351
68	67	Sarnia	Ontario	425431	822019

Canadian NTSC and DTV Allotments²⁰					
Within or Adjacent to Public Safety Spectrum					
(Within 400 Kilometers of the United States/Canada Border)					
11	65	Sudbury	Ontario	463019	805734
9	68	Sudbury	Ontario	463003	810113
19	63	Toronto	Ontario	433833	792315
5	64	Toronto	Ontario	433833	792315
41	65	Toronto	Ontario	433833	792315
47	68	Toronto	Ontario	433833	792315
60	65	Windsor	Ontario	421858	830224
32	68	Windsor	Ontario	420909	825705
54	69	Windsor	Ontario	420909	825705
8	62	Wingham	Ontario	440526	811226
5	65	Carleton	Quebec	480808	660701
49	63	Hull	Quebec	451844	751732
30	64	Hull	Quebec	453011	755102
2	64	Montreal	Quebec	453020	733532
62	69	Montreal	Quebec	453018	733530
5	67	Quebec	Quebec	464704	711554
9	63	Sherbrooke	Quebec	451843	721432
24	68	Sherbrooke	Quebec	451843	721432

Canada has developed a proposal to introduce mobile service on a co-primary basis with broadcasting service in the 746–806 MHz frequency band. In its proposal, Canada indicates that a compelling reason for Canada to seek common spectrum with the United States for public safety use is to “ensure that our law enforcement and safety agencies develop compatible networks and effective services with US public safety agencies.” Canadian public comments on this proposal were requested by September 24, 2001.²¹

2.3 Equipment Availability

This section discusses the progress that has been made concerning the availability of land mobile equipment for the 700 MHz band and DTV sets.

2.3.1 Land Mobile Equipment

Even if the 700 MHz spectrum was fully available today, a full suite of equipment is not available to support public safety requirements. A new portable radio, scheduled to be available in early 2002, is designed to meet APCO Project 16 and Project 25 standards and will tune throughout the 764–870 MHz band.

Research indicated that no fixed or mobile equipment would be available in the near future for the 700 MHz band. Equipment manufacturers indicated that product development for equipment in the 700 MHz band is under way. It appears that manufacturers are waiting until the spectrum becomes fully available. However, as indicated in Section 2 of this report, 700 MHz spectrum is already available in many states.

2.3.2 Digital Television Sets

Based on market response, DTV sets still appear to cost more than most consumers are willing to spend. However, according to the consumer electronics industry, sales of DTV

products are gaining momentum. Sales of DTV products in 2000 were up 400 percent over sales in 1999. A large percentage of these purchases is DTV displays (monitors) and do not contain an integrated tuner for receiving a digital television signal. These numbers also reflect sales to dealers, not sales to the general public. However, if statistics indicated the DTV sets sold to the public, they would still constitute only a small fraction of the more than 25 million sets sold every year in the United States.²²

In October 2001, the Consumer Electronics Association (CEA) announced sales of digital television monitors and sets (i.e., monitors with integrated tuners) are continuing to climb. Sales figures for September 2001 show an increase of 84 percent over the same time last year. The CEA projects sales of DTV sets and monitors will continue to grow rapidly in the coming years, with unit sales of 1.1 million this year, 2.1 million in 2002, 4 million in 2003, 5.4 million in 2004, 8 million in 2005, and 10.5 million in 2006. The CEA also suggests that as high definition content increases, so will the sales figures. Currently, the cable and satellite industries are the prime source for digital content. A combination of broadcast, cable, and satellite will be needed to make the transition complete.²³

3. CONCLUSIONS AND RECOMMENDATIONS

3.1 Conclusions

The research for this report resulted in the following conclusions.

3.1.1 Digital Television Transition Milestones

The digital television transition has made significant progress in the last year. There are 1,688 allotments provided for DTV, for which 1,415 have been granted construction permits or licenses. That represents approximately 84 percent of the total. Transition of the top four network affiliates (ABC, CBS, NBC, and FOX) is nearly complete.

As demand for digital service increases, it is anticipated broadcasters will increase their efforts to complete the transition. The modified FCC policies to promote voluntary clearing of the 700 MHz band should also increase efforts to clear the public safety spectrum.

The allotment of DTV channels during the transition period limits access to public safety spectrum, i.e., Concord, Los Angeles, Philadelphia, and Riverside. These highly populated areas have the most critical need for additional spectrum.

Although the rising sales projections for DTVs are promising, it is not anticipated that 85 percent of the U.S. households will have access to DTV by 2007. Research found that no organization is currently tracking how many households have access to DTV. Consequently, it is unclear where the FCC will obtain this information in making decisions regarding terminating or extending analog television broadcasts.

3.1.2 Border Agreements

Agreements exist between the United States and Mexico, as well as between the United States and Canada. However, these agreements speak only to the transition to DTV. The process for agreements on the use of nonbroadcast services in the vacated 700 MHz band has been discussed; however, no agreements have been signed.

Because both Canada and Mexico have ITU approval for fixed and mobile services in the 746–806 MHz band, it is anticipated that the majority of the broadcast service will be relocated to spectrum below TV channel 60.

3.1.3 Equipment Availability

Demand for DTV products is growing steadily. Estimates by the CEA predict sales of these products will reach 10 million by 2006. Digital content from broadcasters should increase as the consumer demands increase. Currently, the cost of DTV products is still prohibitive to the average consumer.

Although one manufacturer plans to provide portable radio equipment for the 700 MHz band in the near future, indications are that fixed and mobile radio equipment will not be available for some time.

3.2 Recommendations

Public safety agencies should continue to educate the public, community leaders, and elected officials about the need for public safety spectrum. They should advise their congressional representatives of their support for the proposed HERO Act. Deficiencies in spectrum availability in support of public safety operations exposed as a result of the events of September 11, 2001, should serve as another tragic example of the increasing need for spectrum to support public safety's interoperability.

The **public safety community** should closely follow the progress of the DTV Task Force and be ready to respond to any recommendations or requests for comments to ensure its views are represented.

Equipment manufacturers should begin producing equipment that uses this new spectrum. The public safety community should demonstrate its need for the equipment by developing tangible requirements and proposed system architectures. These will not only show the need but also support the development of the funding arrangements required to purchase this new equipment. This is a first step in overcoming the endless cycle of "...no money can be allocated because there is no equipment, and no equipment will be manufactured because there is no market."

The **FCC** should continue negotiations with Mexico and Canada on agreements regarding the use of the 700 MHz band by other than broadcasting services. These agreements will be critical for public safety users to have access to the new 700 MHz band spectrum. Public safety users along the Canadian border should become knowledgeable about the Canadian proposal to reallocate the 746–806 MHz spectrum for fixed and mobile services. The public safety community should initiate action in concert with Canadian public safety counterparts to ensure that common spectrum is allocated for public safety use.

The **FCC** should develop a mechanism for tracking the public's access to DTV to assist them in determining if transmission of analog television broadcasts should be extended beyond December 31, 2006.

LIST OF ACRONYMS

APCO	Association of Public-Safety Communications Officials- International, Inc.
BBA 97	Balanced Budget Act of 1997
CEA	Consumer Electronics Association
DTV	Digital Television
FCC	Federal Communications Commission
HERO	Homeland Emergency Response Operations
ITU	International Telecommunication Union
LOU	Letter of Understanding
MOU	Memorandum of Understanding
MHz	Megahertz
NTIA	National Telecommunications and Information Administration
NTSC	National Television System Committee
PSWAC	Public Safety Wireless Advisory Committee
PSWN	Public Safety Wireless Network

ENDNOTES

¹ Public Law 105-33, Balanced Budget Act of 1997, August 5, 1997.

² Public Safety Wireless Advisory Committee (PSWAC) Report, September 11, 1996.

³ FCC, MM Docket No. 87-268, Sixth Report and Order, "Advanced Television Systems and Their Impact Upon Existing Television Broadcast Service," FCC 97-115, released April 21, 1997.

⁴ FCC, ET Docket No. 97-157, "FCC Reallocates Television Channels 60-69 (746-806 MHz) to Other Services," January 6, 1998.

⁵ FCC, WT Docket No. 96-86, First Report and Order, "The Development of Operational, Technical, and Spectrum Requirements for Meeting State and Local Public Safety Communication Requirements Through the Year 2010," released September 29, 1998.

⁶ Regional Planning Committees (RPC) have been tasked with implementing actual frequency coordination and assignments within their areas. To date, no plan has been submitted to the FCC for consideration.

⁷ Fifteen percent of the top-10 market failed to make the initial milestone and are currently on the third extension, one more than originally authorized in FCC ET Docket No. 97-157.

⁸ Fifteen percent of the top-30 market failed to make the initial milestone and are currently on the second extension as authorized in FCC ET Docket No. 97-157.

⁹ This status is based on the spectrum recovery operation involved with DTV, the lead time required to vacate spectrum, and the fact that no more spectrum is actively being considered for public safety.

¹⁰ FCC, Summary of DTV Applications Filed and DTV Build Out Status, December 12, 2001

¹¹ FCC News Release, "FCC Provides Certain Additional Flexibility to Facilitate Voluntary Clearing of Incumbent Broadcasters in the Upper 700 MHz Band," September 17, 2001.

¹² FCC News Release, "FCC Chairman Michael Powell announces Creation of FCC Digital Television Task Force," October 11, 2001.

¹³ NTIA Manual, Chapter 4, Table of Frequency Allocations, pp. 4-41, and applicable notes.

¹⁴ FCC News Release, "U.S. and Mexico Reach Agreement for Implementing Digital Television Service Along the U.S./Mexico Border, Approving All Stations Slated to Begin Service in November 1998 and May 1999," July 31, 1998, Report No. IN 98-42.

¹⁵ Memorandum of Understanding Between the Federal Communications Commission of the United States of America and the Secretaria de Comunicaciones y Transportes of the United Mexican States Related to the Use of the 54-72 MHz, 76-88 MHz, 174-216 MHz, and 470-806 MHz Bands for the Digital Television Broadcasting Service Along the Common Border, July 22, 1998.

¹⁶ Ibid.

¹⁷ Ibid

¹⁸ Ibid.

¹⁹ FCC News Release, “U.S. and Canada Reach Agreement on Implementing Digital Television Service Along the U.S./Canada Border,” September 29, 2000.

²⁰ Letter of Understanding Between the Federal Communications Commission of the United States of America and Industry Canada Related to the Use of the 54–72 MHz, 76–88 MHz, 174–216 MHz, and 470–806 MHz Bands for the Digital Television Broadcasting Service Along the Common Border, September 22, 2000, Appendix 1B.

²¹ Industry Canada Notice No. DGTP-004-01, “Proposal to Introduce the Mobile Service on a Co-primary Basis with the Broadcasting Service in the Frequency Band 746–806 MHz,” June 8, 2001. Available at <http://strategis.gc.ca/spectrum>

²² *Digital Television Transition*. Roy Stewart, Chief, Mass Media Bureau, presentation to the FCC on April 19, 2001.

²³ CE.org News Release, *DTV Sales Up Again in September*, October 31, 2001. Available at www.ce.org/newsroom/newsloader.asp.