PUBLIC SAFETY PSWN PROGRAM WIRELESS NETWORK

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PUBLIC SAFETY RADIO FREQUENCY SPECTRUM:

Digital TV Transition Status

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1. INTRODUCTION

Virtually all public safety agencies use wireless systems for communications but have an inadequate amount of radio frequency spectrum to communicate effectively. For the majority of public safety agencies, including law enforcement, fire departments, civil defense, and emergency medical response teams, wireless communications are the primary means of exchanging time-critical information in both emergency situations and daily operations. To use these radios, agencies must have access to spectrum. Inadequate spectrum results in congestion and interference, limiting the ability of public safety personnel to communicate. This, in turn, hampers their ability to save lives and protect property.

The Public Safety Wireless Advisory Committee (PSWAC) identified spectrum shortages in its final report to the Federal Communications Commission (FCC) and the National Telecommunications and Information Administration (NTIA) on September 11, 1996. The PSWAC concluded that to meet the demands placed on public safety communications, an additional 97.5 megahertz (MHz) of spectrum is required by 2010.[1] Pursuant to the Balanced Budget Act of 1997 (BBA 97), the FCC partially satisfied these recommendations by allocating 24 MHz of spectrum to public safety.[2] However, the spectrum is still insufficient to meet the public safety community's general communications needs. Specifically, public safety mission requirements have increased significantly, and new technologies and applications, particularly in the data arena, can now aid public safety operations. This expanded mission and these new tools require increased bandwidth and hence additional 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, 69). The availability and use is contingent on the relocation of television broadcast stations to channels below 60 as part of the transition from analog to digital television (DTV). BBA 97 dictates that broadcast stations will lose channels above 59 on December 31, 2006, provided that 85 percent of U.S. households own at least one DTV receiving device on that date. Failure to obtain the 85 percent DTV household penetration by December 2006 would allow existing television stations on Channels 60-69 to remain on the air until the percentage of DTV users increases to that goal.

This document examines issues related to the progress of the analog-to-digital television transition and the time frame in which public safety agencies can transition to the newly allocated spectrum. This document makes no judgements regarding decisions or events that have impacted the DTV transition currently in progress.

2. SUMMARY OF ISSUES AND CONCERNS

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

2.1 DTV Transition Delay Due to Missed Milestones

The FCC reallocated 24 MHz of television broadcast spectrum, 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. The transition to DTV is scheduled for completion at the end of 2006. The FCC developed an ambitious milestone schedule that provides for the needs of the current broadcast users and protects them from unreasonable costs.[3] To date, the DTV transition has fallen behind its scheduled timeline for acquiring broadcast licenses in the markets of the top 10 and top 30 broadcast affiliates. Analog television and DTV stations currently using the newly designated spectrum for public safety may continue operating if the conditions established by Congress and the FCC and outlined in Section 3.1 of this document are not met. Because the milestones have not been met or have been extended, it is not expected the transition will be accomplished on schedule. If the transition is not completed on schedule, public safety users will be denied use of the newly allocated spectrum beyond December 2006.

Based on market response, DTV sets currently appear to cost more than most consumers are willing to spend. The DTV modulation standard has not been fully accepted by manufacturers, and some have recommended changes that would result in efficiencies and greater cost effectiveness. This conflict within industry concerning the standards may cause manufacturers to hold off full-scale production until the standards issue is resolved. Full-scale production would likely drop the average cost of a typical DTV set to a level much closer to a price the average consumer would consider when buying a television. The Consumer Electronics Association (CEA) predicts that sales of DTVs in 2006 will be 50 percent based on current trends,[4] far short of the 85 percent anticipated by the BBA 97.

2.2 Border Restrictions and Interference Potential

The reallocation of this spectrum from the broadcast service to the fixed and mobile services for public safety use applies only within the United States. This reallocation is not in accordance with the International Telecommunication Union (ITU) allocation for Region 2, in which North American and South American countries fall. Therefore, Canada and Mexico are not required to provide public safety users any interference protection from television broadcasts. To date, no agreements exist between the United States and Canada or Mexico that would provide the necessary interference protection to public safety wireless users.

2.3 Public Safety's Lack of Access to New Spectrum During Transition

The FCC authorized assignment of public safety users within the reallocated frequency bands before DTV transition completion; however, this public safety use is on a non-interference basis (NIB). Users with NIB assignments cannot cause interference to others operating in the primary service, in this case the broadcast service, and must accept interference from users operating in the primary service. Put simply both full-power and low-power television (LPTV) stations, TV translators, and TV boosters operating in Canada and Mexico would all have primary service assignments and thus, priority over any U.S. public safety user in the new band.

The FCC created channel plans for the new spectrum and then tasked the Regional Planning Committees (RPC) with developing regional plans for the actual use of the new spectrum. The RPCs will use the FCC channel plans and ensure that the spectrum is used most efficiently based on the area, public safety users, existing broadcast users, and equipment available at the time. However, because no plans have been submitted to the FCC for approval at this time, the spectrum is not yet available for public safety use. Currently there are research and development projects that are experimenting with wireless systems that operate in the spectrum reallocated for public safety use, but no commercially produced equipment is available and no permanent frequency assignments have been made.

The Public Safety National Coordination Committee (NCC) has endorsed establishment of State Interoperability Executive Committees (SIEC) to manage public safety interoperability spectrum and administer State Interoperability Plans. The SIECs would complement the work of the RPC and provide greater emphasis on the critical interoperability spectrum.

The PSWAC Report identifies the growing need for public safety spectrum. The report indicated a need for an additional 25 MHz of spectrum for public safety use 5 years from the report date. None of the transition spectrum has been made available to public safety, and even if the DTV transition occurs on schedule, the spectrum will not be available for use nationwide until 2007, 10 years from the PSWAC Report date. The resulting spectrum shortfall for public safety agencies will leave them in a continual spectrum shortage as they progress into the 21st century.

2.4 Equipment Availability

As expected, wireless manufacturers' support reflects the number of customers in a given market. No equipment is available for use by public safety agencies on the new spectrum. Even if equipment were available today, only portions of the new spectrum could be used in some geographical areas until the DTV transition is complete.

3. SPECTRUM RECOVERY PLAN

This section describes the spectrum recovery plan process and the timeline for completion of that process as it relates to DTV. Spectrum recovery is an ongoing FCC initiative[5] to better utilize the spectrum by exploiting new technologies that will use the spectrum more efficiently thus freeing up this valuable asset. Recovered spectrum is then made available for new services and applications.

3.1 Process

As directed in the BBA 97, the FCC reallocated television channels 60-69 for other than broadcast service use in January 1998. The reallocation is contingent on the transition of commercial and public television from analog format to DTV. The spectrum recovered from television channels 60-69 will be auctioned off commercially, with the exception of 24 MHz in the 764-776 MHz and 794-806 MHz bands reallocated for public safety use.[6]

The U.S. Congress authorized distribution of additional broadcast spectrum to individual TV broadcasters so that they could introduce the new DTV service while simultaneously continuing with their current analog broadcasts. A timeline was established to map progress of the transition. The conditions listed below were established as a fail-safe way to ensure that broadcast television users were not denied television service as a result the transition. The DTV Allotment Plan[7] 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 the following conditions:

- If one of the four major network affiliates (i.e., ABC, CBS, FOX, 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, cable service).

The FCC reserves 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 has already been done. In the following cities, the complete 24 MHz allocation may never be available because stations in these cities have been assigned a DTV channel in the public safety band[8]:

- Concord, California – Channel 63
- Philadelphia, Pennsylvania – Channel 64
- Riverside, California – Channel 68
- Aguadilla, Puerto Rico – Channel 69
- Mayaguez, Puerto Rico – Channel 63.

3.2 Timeline

The following table includes the dates of both the PSWAC report and milestones listed within that report, along with the DTV milestones. Note that three of the first five milestones have not been accomplished. At this rate, the December 2006 completion date will not be achieved.

YEAR	DATE	MILESTONE	STATUS
1996	September	PSWAC Report released[9]	N/A
1997	April	FCC establishes DTV service rules and issues DTV assignment/allotment tables[10]	Complete
1998	January	FCC reallocates TV channels 60-69 for other than broadcast services[11]	Complete
1998	September	FCC to start issuing licenses to public safety agencies in reallocated spectrum[12]	Missed[13]
1999	May	Four major network affiliates to be "on the air" in top 10 markets	Missed[14]
1999	November	Four major network affiliates to be "on the air" in top 30 markets	Extended[15]
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[16]	No Longer Likely[17]
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 non-commercial 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[18]

4. ISSUES AND CONCERNS DETAILED

This section discusses the issues and concerns related to the DTV transition in greater detail.

4.1 Possible Failure to Meet Timeline Milestones

The timeline outlined by the FCC for the DTV transition is very aggressive and dependent upon both the broadcasters' ability to update and install transmission equipment and the public's desire to purchase and use the new features of DTV. Digital televisions were introduced with a high purchase price with the expectation that prices would drop as mass production of DTV progressed. The cost has not gone down as expected, and the consumer response has been slow. The CEA predicts a 50 percent DTV product penetration in 2006 if broadcasters meet all the FCC DTV transition deadlines. The CEA prediction is well below the minimum standard set in Public Law 105-33, Section 3004, which states: "In markets with insufficient digital television services, analog television may continue to operate after 12/31/2006 if less than 85% of households do not have at least one television capable of receiving digital service (DTV television set, set-top box, cable service)."

Remarks made by FCC Chairman William E. Kennard to the Museum of Television and Radio on October 10, 2000, urges the Congress to speed up the transition to DTV. He indicated that it took color TV 22 years and VCRs 16 years to reach 85% penetration. He also stated that we may not see that level of DTV penetration until 2025. Chairman Kennard indicated there are three things that Congress can do to accelerate the transition to DTV. First, Congress should reconsider the 85% loophole on the 2006 date so that it doesn't become used as a "trick number" to justify making the double dose of spectrum a broadcaster entitlement for the next 25 years. Second, Congress should direct the FCC to adopt a requirement that, by a given date-say January 1, 2003(all new television sets include the capability to receive DTV signals. Third, Congress should require that, as of January 1, 2006, broadcasters would pay a fee for the use of the analog channel.[19]

One issue affecting the broader availability and use of DTV is the FCC-mandated modulation standard. The modulation standard 8 level Vestigial Side Band (8-VSB) selected for DTV is now being debated within the broadcast industry, with many recommending use of Coded Orthogonal Frequency Division Multiplex (COFDM) modulation instead. The FCC's Office of Engineering and Technology conducted a study and recommended retention of the 8-VSB modulation standard.[20] Because television manufacturers may be reluctant to produce televisions until the standard is resolved, this issue could contribute to a delay in mass production of DTV and to the resulting continued high cost of the DTV sets.

Another issue involves the relocation of TV stations from channels 60-69. The FCC directive to relocate television stations from these channels affects not only the analog and digital broadcast stations but also LPTV stations, TV translators, and TV boosters that operate in the same band. New Class A LPTV stations must move into core broadcast spectrum channels and are not permitted on channels 52-69. Relocation requires additional engineering to ensure minimal interference when moving either full-power broadcast stations or LPTV devices.

In addition, DTV stations were initially allotted channels based on replication of their National Television Systems Committee (NTSC) service area. The Community Broadcaster Act, which created Class A LPTV service, allowed DTV stations to file to maximize their facilities, and most did. This action could decrease the amount of core broadcast spectrum available.

Another relevant factor in the DTV transition process is the spectrum auction. The FCC was mandated by the Congress to auction the spectrum recovered from TV channels 60-69 for use after the DTV transition, which is currently scheduled for completion December 31, 2006. The 24 MHz of spectrum designated for public safety was excluded from this auction. The FCC's original auction date was June 7, 2000, rescheduled to September 6, 2000, and rescheduled a second time to the current auction date of March 6, 2001.[21] The importance of this auction is that once the spectrum has been sold, the new owners would provide incentives to broadcasters to vacate the spectrum. The auctions were first scheduled early so that market pressures would influence the broadcast community to vacate the spectrum. The FCC, by delaying the auctions, has thwarted the natural market forces that would have been building since June 2000 to move the current broadcast stations out of channels 60-69. The FCC has already agreed to allow the new spectrum owners to negotiate directly with broadcasters to facilitate vacating TV channels 60-69. This is yet another factor that will impede public safety community access to its portion of the recovered spectrum.

Finally, broadcasters and cable TV operators have not agreed on all the technical and security issues related to carrying DTV signals over cable.[22] Cable operators may need to upgrade their facilities to carry DTV signals. Any issue that could delay the broadcast of DTV signals to the consumer has the potential to keep the market penetration below 85 percent, which could be cause for the FCC to allow the current users in television channels 60-69 to remain beyond 2006.

As a result of the numerous issues described above, there is concern within the public safety community that DTV will fail to meet its expected transition goals and that broadcast users will not be required to vacate the spectrum designated for public safety by December 2006.

4.2 Border Agreements

The ITU, an organizational element of the United Nations, is responsible for establishing international standards and procedures to facilitate cooperation between telecommunications administrations of governments. The allocation for the frequency band that includes TV channels 60-69 is broadcasting. Under the provisions of the ITU, the United States is obligated to comply with the spectrum allocations specified in the ITU Radio Regulations' Article 8 (International Table of Frequency Allocations). However, domestic spectrum uses may differ from the international allocations, provided these domestic uses do not conflict with neighboring countries' spectrum uses that do comply with international regulations or agreements.

Based on these regulations, Canada and Mexico are not obligated to protect U.S. frequency assignments made in the bands for TV channels 60-69 if those assignments are not made for broadcast (TV) stations. This issue will affect not only public safety but also the remaining recovered spectrum scheduled for auction to commercial users. The result would be that the U.S. users would have to accept interference from any Canadian or Mexican broadcast station, and public safety users cannot cause harmful interference to the Canadian or Mexican broadcast stations.

A separate agreement to protect public safety communications could be reached between countries such as the United States and Canada. Canada and the United States have signed a Letter of Understanding regarding the introduction of DTV service within 400 kilometers on either side of the U.S.-Canadian border. This agreement focuses on DTV and does not protect any service outside of broadcast for the frequency band in question. It specifically refers to protecting LPTV stations, which are numerous along the border between Canada and the United States. LPTV broadcast stations are considered secondary to full-power broadcast stations but treated as a primary service, for interference purposes against other radio services such as land mobile. The actual wording of the Agreement states, "Until a separate agreement is reached on non-broadcast uses, such new services shall not claim protection from DTV stations or analog TV stations established in accordance with the existing Agreement." Although an agreement currently exists between the U.S. and Mexico concerning the digital television transition, it does not reference the protection of non-broadcast services.[23]

Figure 1. U.S. and Canadian Border Area

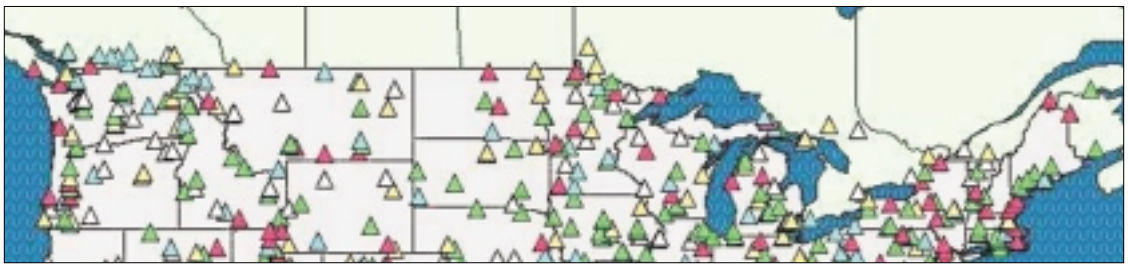


Figure 1 illustrates the U.S.-Canadian border area. Colored triangles depict the locations of broadcast stations currently operating in the newly reallocated public safety spectrum. The colored triangles indicate locations where a single television channel, 6 MHz of spectrum, is in use on channels 63 (Red), 64 (Blue), 68 (Yellow), or 69 (Green). White triangles indicate locations where multiple channels are being broadcast. Because all the Canadian stations would be operating in the primary service and all of the U.S. public safety users would be operating on a secondary basis (i.e., non-interference), the public safety users would very likely lose in any dispute. Notice the concentration of Canadian TV stations in the new public safety frequency bands adjacent to the states of Washington, Minnesota, Michigan, New York, and Vermont. It is questionable whether Canada would ever issue any type of authorization to operate non-broadcast emitters along the border because they are not required to accept interference from such stations.

4.3 Public Safety's New Spectrum

Today there are no frequency assignments for public safety in the newly reallocated spectrum. The FCC has defined a channeling plan and has delegated creating actual spectrum use plans to Regional Planning Committees (RPC). RPC planning takes into account local issues that are not always visible to the FCC in Washington, DC. The RPCs will consider the television broadcast stations, low-power translators, and boosters still operating on channels 63, 64, 68, and 69 for the duration of the DTV transition.

4.3.1 Spectrum Availability-Near Term

If the newly reallocated spectrum could be used today, it would be most available in the places that need it the least. The greatest need for public safety spectrum is in the population centers where many public safety agencies work continuously, mostly independently, and use separate wireless networks to conduct day-to-day operations.

Unfortunately, the same reasons that require more public safety agencies also dictate a larger and more congested television broadcast area. Although most sparsely populated areas of the United States could use between 18 MHz to 24 MHz of spectrum reallocated for public safety, some populated areas could use only 6 MHz or less. While the DTV transition is ongoing, television stations, as well as TV translators and LPTV stations, will be using channels 63, 64, 68, and 69 temporarily.

Public safety use of the new spectrum has been further hampered as a result of the FCC decision to allow transitioning DTV stations to expand their coverage area beyond that of the original analog stations. This decision requires reengineering existing stations and forces the planners to provide larger broadcast protection areas. This increases the distance separation between television stations and reduces the available spectrum for other stations to use during the DTV transition. Expanding the DTV stations area coverage beyond that of the analog stations they are replacing reduces the availability of spectrum in the core TV spectrum (channels 2-59) and forces broadcasters to remain on the reallocated public safety spectrum longer.

The U.S. public safety agencies operating within 100 kilometers of the Canadian border will have far less of the reallocated public safety spectrum available than agencies located in the rest of the United States. Canada does not plan to protect U.S. public safety networks from interference from Canadian broadcast stations because, in accordance with ITU regional allocation, broadcast stations are the primary radio service authorized in these frequency bands.

Figure 2. U.S. & Canadian TV Stations Operating on Channels 63, 64, 68, 69

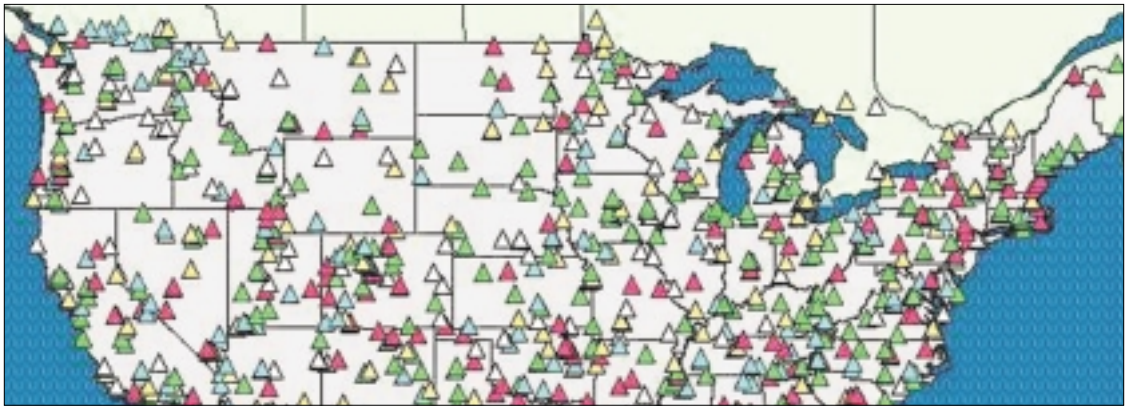


Figure 2 shows broadcast stations operating on the spectrum just reallocated to public safety. Colored triangles indicate a single transmitter operating on one of the television channels 63 (Red), 64 (Blue), 68 (Yellow), or 69 (Green). A white triangle indicates multiple stations transmitting from one location. In addition, Table 1 indicates the number of TV stations operating on these channels today designated by both channel and state.

Table 1. Licensed TV Stations in Public Safety Bands, by State

STATE	CH63	CH64	CH68	CH69	TOTAL
Alabama	14	10	6	13	43
Alaska	8	9	8	15	40
Arizona	41	31	19	14	105
Arkansas	13	3	4	10	30
California	43	28	33	46	150
Colorado	49	19	10	21	99
Connecticut	0	0	0	5	5
Delaware	0	2	0	0	2
Florida	24	16	26	37	103
Georgia	9	11	14	17	51
Hawaii	12	4	11	6	33
Idaho	7	15	9	19	50
Illinois	4	4	7	6	21
Indiana	14	1	4	13	32
Iowa	7	8	3	21	39
Kansas	3	5	7	8	23
Kentucky	1	2	6	11	20
Louisiana	8	3	2	14	27
Maine	6	6	0	5	17
Maryland	1	0	4	1	6
Massachusetts	2	0	5	2	9
Michigan	2	11	11	19	43
Minnesota	18	11	8	19	56
Mississippi	8	8	4	6	26
Missouri	8	15	15	7	45

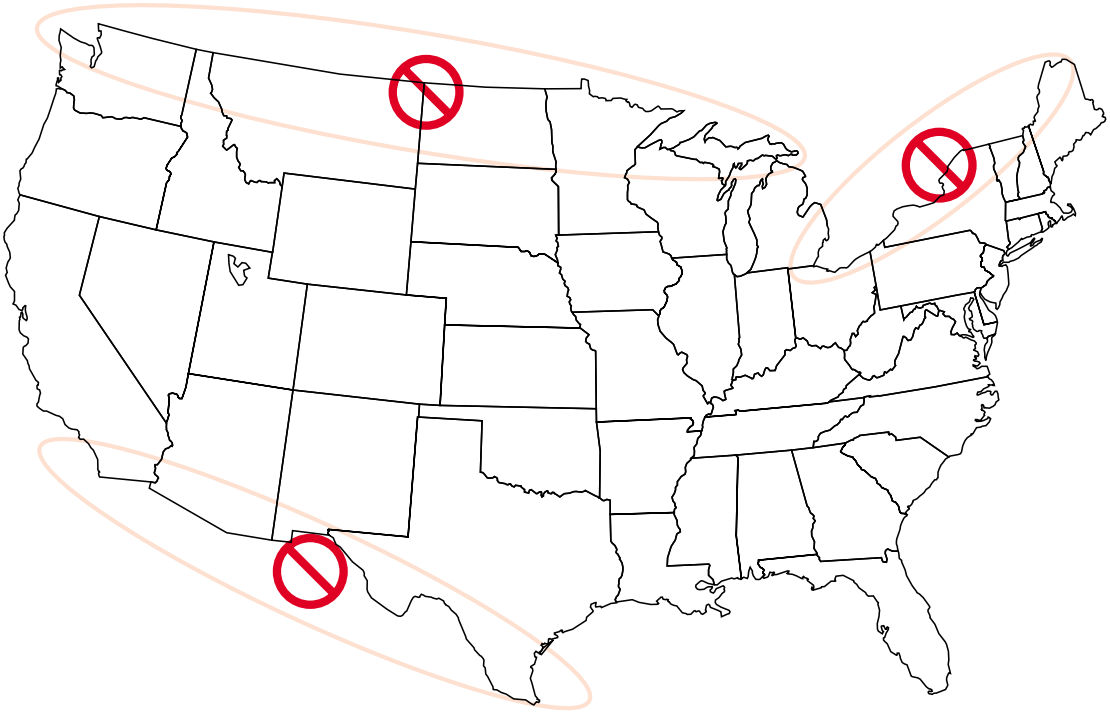
STATE	CH63	CH64	CH68	CH69	TOTAL
Montana	6	8	6	8	28
Nebraska	6	3	4	13	26
Nevada	24	7	4	13	48
New Hampshire	1	0	0	4	5
New Jersey	9	0	6	3	18
New Mexico	21	12	17	20	70
New York	11	7	6	19	43
North Carolina	7	19	8	14	48
North Dakota	3	1	2	6	12
Ohio	1	19	21	6	47
Oklahoma	29	9	6	11	55
Oregon	19	12	15	20	66
Pennsylvania	16	11	4	21	52
Rhode Island	0	5	0	9	14
South Carolina	7	0	6	7	20
South Dakota	0	3	4	8	15
Tennessee	7	11	9	9	36
Texas	30	41	39	65	175
Utah	42	20	9	27	98
Vermont	1	4	3	3	11
Virginia	9	5	14	9	37
Washington	10	14	17	10	51
West Virginia	1	0	0	6	7
Wisconsin	5	4	10	6	25
Wyoming	5	3	4	7	19
TOTALS	**572**	**440**	**430**	**659**	**2101**

4.3.2 Spectrum Availability-Long Term

December 31, 2006, is the scheduled date for completion of the DTV transition. Once the transition is complete, regardless of the actual date, the spectrum reallocated to public safety should be made fully available to public safety agencies. However, the spectrum recovered from the DTV transition and designated for use by public safety may never be fully available in the areas of southern California, Seattle Tacoma area, the Detroit metropolitan area, and along the northeastern United States and Canadian border region, for the reasons discussed in the Section 4.2 of this document.

Many other issues may restrict use of this new spectrum. The areas identified in Figure 3 have some of the most congested television coverage areas. The relocation of all existing broadcast emitters, full-power and LPTV broadcast stations, along with TV translator and booster emitters, may prove infeasible. The lack of an agreement between the United States and Canada for interference protection of non-broadcast stations along the Canadian border will still restrict the public safety use of the newly reallocated spectrum. The FCC has frozen the licensing of new stations and the movement of existing LPTV stations until the transition is further developed. The need for these broadcast stations can grow over time, and their advocates will be heard by the FCC through filings and legal actions.

Figure 3. Areas Where New Public Safety Spectrum May Be Restricted



4.4 Equipment Availability

The new frequency spectrum designated for public safety use will not be fully available until 2006 and possible even later depending on DTV's transition progress. Even if the spectrum were made fully available today, it would take 18 to 24 months for manufacturers to make compatible radios available for general use. Funding for most public safety agencies is determined at least 1 year, and possible as many as 3 years, in advance of actual expenditure. Public safety agencies today are purchasing new wireless communications systems from the last funding cycle. Because no existing wireless system that tunes in the reallocated public safety spectrum is available today and no date has been defined when such a system could be used if it did exist, public safety agencies cannot yet consider the recovered DTV spectrum in purchasing decisions.

This problem is becoming circular. The manufacturers will not fund development of radios until the spectrum is available and the customers are funded. Customers will not attempt to get funding until they are sure that the spectrum and equipment are available and the equipment is not cost prohibitive. Unfortunately this cycle delays public safety wireless users' ability to use the new spectrum allotted to them by the Congress.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The research for this report resulted in the following conclusions.

5.1.1 Digital Television Transition Delay Due to Missed Milestones

Spectrum recovery operations tied to the transition of broadcast television from an analog format to digital are in danger of failing to meet congressionally mandated milestones. This conclusion is based on review of the timeline in Section 3.2, the fact that three of the first five milestones were not achieved on schedule, and the issues detailed in Section 4.1. Failure of the spectrum recovery delays the reallocation process that provides public safety 24 MHz of needed spectrum.

5.1.2 Border Restrictions and Interference Potential

Canada and Mexico borders areas may restrict public safety agencies' access to the newly reallocated 700MHz spectrum because of the lack of agreements between the United States and each of these countries. Currently the 700 MHz spectrum reallocated to public safety would not be protected from harmful interference from foreign broadcast stations. Those same public safety agencies cannot cause interference for any broadcast station beyond U.S. borders. This restriction will cause U.S. public safety agencies in border areas to be denied access to portions of the newly reallocated public safety spectrum.

5.1.3 Public Safety's Lack of Access to New Spectrum During Transition

Lack of spectrum for public safety agencies continues to limit their ability to perform mission-critical operations. The Congress' quick response to the 1996 PSWAC report, while greatly appreciated and very useful in the future, attempts to apply a long-term planning solution to a short-term problem. By the time the congressionally mandated public safety spectrum becomes fully available, the demand for public safety spectrum will have grown beyond the 24 MHz provided by the BBA 97. The spectrum reallocated to public safety in 1998 is still totally unavailable today and may not be useful for many years for the following reasons:

- Continued U.S. television broadcast use
- Continued Canadian and Mexican television use
- Lack of plans for use of the newly-allocated spectrum for both general use and interoperability
- Unavailability of equipment.

5.1.4 Equipment Availability

No radio manufacturer currently makes radios that operate in the spectrum reallocated to public safety. This band has been used solely for broadcast for many years. It will take 18 to 24 months to manufacture equipment for this band.

5.2 Recommendations

To facilitate availability of the reallocated spectrum, for public safety, to meet immediate requirements, the following actions are recommended:

- The FCC must continue to enforce the ambitious schedule for the transition of television broadcast from analog to digital.
- The public safety community should petition the FCC for equal priority of the land mobile radio service and the broadcast service with the Canadian and Mexican governments. This would provide frequency interference protection for public safety operations in areas along the Canadian and Mexican borders.
- RPCs should take aggressive actions to develop plans for use of the spectrum.
- SIECs should be established to manage the interoperability spectrum and administer State Interoperability Plans.

- The public safety community should work with equipment manufacturers to demonstrate its immediate need for equipment that can operate in the new spectrum.
- Public safety agencies must continue to be involved in educating the public, community leaders, and elected representatives about the growing need for public safety spectrum.
- Public safety agencies should advise the Congress of their support for the FCC Chairman's recommendations to accelerate their access to the new spectrum.
- New initiatives for getting access to more spectrum need to be started now to provide for the additional spectrum projected to be required by public safety agencies in 2010.

LIST OF ACRONYMS

8-VSB	8 level Vestigial Side Band
BBA 97	Balanced Budget Act of 1997
CEA	Consumer Electronics Association
COFDM	Coded Orthogonal Frequency Division Multiplex
DTV	Digital Television
FCC	Federal Communications Commission
ITU	International Telecommunication Union
LPTV	Low-Power Television
MHz	Megahertz
NCC	Public Safety National Coordination Committee
NCTA	National Cable Television Association
NIB	Non-Interference Basis
NTIA	National Telecommunications and Information Administration
NTSC	National Television Systems Committee
PSWAC	Public Safety Wireless Advisory Committee
PSWN	Public Safety Wireless Network
RPC	Regional Planning Committee
SIEC	State Interoperability Executive Committee
UN	United Nations

ENDNOTES

[1] *Public Safety Wireless Advisory Committee (PSWAC), Final Report, September 11, 1996, p. 3.*

[2] *FCC, FCC WT Docket 96-86, "The Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Agency Communication Requirements Through the Year 2010," August 6, 1998.*

[3] *FCC, Fifth Report and Order, "Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service," FCC 97-115, released April 21,1997.*

[4] *CEA, "Revised DTV Sales Projections and 1999 DTV Sales Figures Demonstrate Link Between Sales and Available Content," News Release, April 10, 2000.*

[5] *FCC, "Principles for Reallocation of Spectrum to Encourage the Development of Telecommunications Technologies for the New Millennium," Policy Statement, released November 22, 1999.*

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

[7] *FCC, "Memorandum Opinion and Order on Reconsideration of the Sixth Report and Order," FCC 98-24, released February 23, 1998.*

[8] *Each TV channel has 6 MHz bandwidth.*

[9] *Public Safety Wireless Advisory Committee (PSWAC), Final Report, September 11, 1996.*

[10] *FCC, "Sixth Report and Order, Advanced Television Systems and Their Impact upon the Existing Television Broadcast Service," FCC 97-115, released April 21, 1997.*

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

[12] *FCC, WT Docket No. 96-86, "The Development of Operational, Technical and Spectrum Requirements For Meeting State and Local Public Safety Communication Requirements Through the Year 2010," August 6, 1998.*

[13] *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.*

[14] *15 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.*

[15] *15 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.*

[16] *Motorola, in conjunction with the city of Chicago, is experimenting with video broadcast in the 700 MHz band to public safety personnel in mobile units, i.e., fire trucks and police vehicles. No permanent frequency assignments have been made to date.*

[17] *Although the Congress directed the reallocation of spectrum for public service almost immediately after receiving the PSWAC Final Report, none of the spectrum reallocated for public safety has been made available for actual assignments. The lack of available equipment makes this milestone unachievable.*

[18] *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.*

[19] *Remarks by FCC Chairman William E. Kennard to the Museum of Television and Radio, October 10, 2000.*

[20] *FCC, DTV Report on COFDM and 8-VSB Performance, FCC/OET 99-2, released September 30, 1999.*

[21] *FCC, "Auction of Licenses for the 747-762 and 777-792 MHz Bands Postponed Until March 6, 2000," Public Notice, July 31, 2000.*

[22] *National Cable Television Association, "NCTA Urges FCC to Endorse Voluntary Agreements for Digital Consumer Electronics Equipment and Cable System Compatibility," Press Release, June 6, 2000.*

[23] *Memorandum of Understanding between the FCC and the United Mexican States Related to the Use of Frequency Bands 54-72 MHz, 76-88 MHz, 174-216 MHz, and 470-806 MHz For Digital Television Broadcast Along the Common Border, April 2, 1997.*