SECTION B-2

PUBLIC SAFETY SPECTRUM NEEDS

STATE AND LOCAL PUBLIC SAFETY SPECTRUM NEEDS

INTRODUCTION

When the President initiated the Spectrum Policy Reform Initiative in June 2003, he requested the Secretary of Commerce to prepare legislation and other recommendations to, among other things, develop means to address the critical spectrum needs of national security, homeland security, and public safety.

Subsequently, the President directed the Secretary of Homeland Security, in consultation with other Federal, state, and local agencies "to address issues related to communication spectrum used by the public safety community, as well as continuity of government operations" in a comprehensive plan, the "Spectrum Needs Plan."[229] DHS accordingly formulated a Public Safety Spectrum Needs Plan (Spectrum Needs Plan) after consulting with the NTIA, the FCC, and state, local, tribal and Federal public safety agencies. The President also directed the DOC to integrate the Spectrum Needs Plan and agency-specific strategic spectrum plans into a "Federal Strategic Spectrum Plan."[230]

DHS's plan addressed concerns of public safety spectrum users, identified the spectrum assets currently available and provided information concerning the public safety community's interest in spectrum in the 700 MHz band. Because the Spectrum Needs Plan was submitted prior to the FCC's actions in 2007 with respect to public safety use of spectrum in the 700 MHz band, it did not address the FCC's most recent decisions concerning public safety's access to narrowband and broadband allocations in that band. The FCC recently designated 10 MHz of spectrum in the 700 MHz band for a nationwide interoperable public safety broadband network to be provided by a public-private partnership.[231] This 10 MHz is part of the 24 MHz in the 700 MHz band already allocated to public safety (12 MHz for narrowband, 10 MHz for broadband,

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[229] Presidential Determination: Memorandum for the Heads of Executive Departments and Agencies, Improving Spectrum Management for the 21st Century, §§ 2(c), 3(a) (Nov. 30, 2004) (2004 Executive Memorandum) http://www.whitehouse.gov/news/releases/2004/11/20041130-8.html.

[230] State and local public safety radio services fall under the regulatory authority of the FCC. Therefore, rules, procedures, and spectrum needs are developed and codified by them. It is anticipated that the FCC will provide additional information on behalf of the State and local public safety communities during the development of the National Strategic Spectrum Plan.

[231] *See*, *Implementing a Nationwide, Broadband, Interoperable Public Safety Network in the 700 MHz Band; Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communications Requirements Through the Year 2010*, PS Docket No. 06-229, Second Report and Order, 22 F.C.C.R. 15289 (2007) (Second Report and Order). *See also*, Intelligence Reform and Terrorism Prevention Act of 2004, Pub.L.No. 108-458, § 7303, 118 Stat. 3638 (2004). *See also*, *FCC Revises 700 MHz Rules to Advance Interoperable Public Safety Communications and Promote Wireless Broadband Deployment,* FCC Press Release, http://fjallfoss.fcc.gov/edocs_public/attachmatch/DOC-275669A1.doc.

and 2 MHz for an internal guard band).[232] Thus, the following section contains information that in addition to that provided in the Spectrum Needs Plan, in order to accurately describe how spectrum will be made available for a nationwide interoperable broadband public safety system following the broadcast industry's return of analog spectrum in early 2009.

CURRENT NON-FEDERAL PUBLIC SAFETY SPECTRUM ASSETS

The FCC has allocated more than 97 MHz of spectrum for public safety service providers, including spectrum allocated prior to 2007. This includes 24 MHz of spectrum in the 763-775 and 793-805 MHz bands,[233] depicted in Table B-8, which will be available nationwide when terrestrial television broadcasters transition to digital television and release the spectrum currently used for analog transmissions. Congress mandated that non-Federal public safety entities will have nationwide access to all of the 24 MHz no later than February 17, 2009 when broadcasters must cease analog operations.[234]

[232] *Id*.
[233] These two bands were adjusted by 1 MHz in the downward direction (to 763-775 MHz and 793-805 MHz) by the FCC in its recent order on the 700 MHz band. *Infra* note 254 at 131.
[234] Digital Television Transition and Public Safety Act of 2005, Pub.L. No. 109-171, 120 Stat. 4, Deficit Reduction Act of 2005, Title III, *codified at* 42 U.S.C. §§ 309, 337 (2006) (Digital Television Transition Act).

Table B-8 depicts the existing allocations to Non-Federal public safety interests.

Table B-8. Existing Non-Federal Public Safety Frequency Bands*

Non-Federal Public Safety Frequency Band (MHz)	Voice	Narrowband Data		Broadband Data	National Interoperability[235]	Outside Interference	Conventional or Trunked
2–25	✓	✓					Conventional
25–50	✓	✓					Conventional
72–76	✓	✓					Conventional
150–162[236]	✓	✓			✓		Both
220–222	✓	✓			✓		Conventional
450–470	✓	✓			✓		Both
470–512[237]	✓	✓					Both
763–775 793–805[238]	✓	✓		✓	✓		Both
806–821 851–866	✓	✓				✓	Both
821–824 866–869	✓	✓			✓	✓	Both
4940–4990[239]	✓			✓			N/A

*Source: DHS Public Safety Spectrum Needs Plan with addition of broadband notation for 700 MHz bands

[235] Current national interoperability channels are:

0.25 MHz of the 150–174 MHz band, which includes five narrowband channels in the 162–174 MHz federal band.
0.2 MHz of the 450–470 MHz band
2.6 MHz of the 763–775–776 and 793–805–806 MHz band
0.125 MHz of the 821–824 and 866–869 MHz band.

[236] Fire departments tend to select the 150-162 MHz band because of its long-range propagation characteristics.

[237] All frequencies in this band are only available in 11 metropolitan areas.

[238] *Infra* n. 256.

[239] Allocations in 4940–4990 MHz are best suited for incident site communications, i.e., high-speed, short-distance transmissions.

Current Federal Spectrum Use and Future Spectrum Requirements

Unencumbered Spectrum

The DHS Spectrum Needs Plan emphasizes that certain public safety communications, especially those supporting emergency situations, command and control, situational analysis, and other mission-critical functions require spectrum unencumbered by other users to ensure reliability and eliminate or reduce potential interference.

Interoperability

The requirement for interoperability is a major concern for public safety identified by DHS. Federal agencies primarily use the 162-174 MHz and 406.1-420 MHz bands for their public safety requirements. Local and state public safety agency systems operate in many different bands, ranging from 25 MHz to 4.9 GHz. Existing public safety communications systems operating below 512 MHz lack common and sufficient channels to support all interoperability requirements. Fewer than a dozen standardized state and local interoperability frequencies, set aside by the FCC, exist below 512 MHz.

DHS cites the following challenges to achieving interoperability: (1) inadequate interagency cooperation; (2) insufficient standard operating procedures; (3) lack of available interoperable equipment; (4) inadequate training; and (5) lack of sufficient interoperable spectrum. Interoperability gateways, such as IP switches, have demonstrated the ability to "patch" systems together in certain circumstances.

However, the Spectrum Needs Plan indicates that such techniques are insufficient to provide broad-based, reliable and robust interoperability because of high costs, requirements for technically-trained staff, and limitations on the ability of such systems to support direct unit-to-unit communications.

The Spectrum Needs Plan suggested that additional allocations of spectrum designated specifically for interoperability could assist agencies in local, state and Federal homeland security coordination. Contiguous frequency allocations also could permit efficient equipment design and allow public safety agencies to benefit from economies of scale in equipment purchases.

Broadband Operational and Spectrum Requirements

Public safety requirements for and use of bandwidth-intensive wireless technologies are increasing. These broadband services include: in-car video cameras, medical video, mobile surveillance, software downloads, and transmission of large data files. The FCC reallocated the 4940-4990 MHz band in 2003 from a Federal Government-only allocation for fixed and mobile non-Federal public safety services.[240] In its reallocation order, the FCC adopted rules "intended

[240] *See, The 4.9 GHz Band Transferred from Federal Government Use,* Third Report and Order, 18 F.C.C.R. 9152 (2003) (*Third Report and Order*). *See also*, *The 4.9 GHz Band Transferred from Federal Government Use*, WT

to accommodate a variety of new broadband applications such as high-speed digital technologies and wireless local area networks for incident scene Management, dispatch operations and vehicular operations." However, according to the Spectrum Needs Plan, the non-Federal public safety community has not extensively used the 4940-4990 MHz band because of propagation characteristics, limited geographic range, lack of available and affordable equipment, and susceptibility to adverse weather conditions. Within the context of the reallocation of the analog television spectrum in the 700 MHz band, numerous public safety organizations supported an allocation of 700 MHz band spectrum for broadband use, as part of the 24 MHz already identified for public safety use beginning in 2009.[241] The recent FCC action to create a nationwide interoperable public-safety broadband system in the 700 MHz band is intended to address these requirements.[242]

FCC Actions to Provide For a Nationwide Interoperable Broadband Public Safety Network

The FCC, in August, 2007, determined that 10 MHz of the spectrum from the D Block (758-763 MHz and 788-793 MHz) to be auctioned in early 2008, combined with 10 MHz of public safety's 24 MHz (763-768 MHz and 788-793 MHz), will be made available to form a nationwide shared public safety/private broadband network. The Commission concluded that a single nationwide Public Safety Broadband License would be issued for the 10 MHz designated for public safety. The "Public Safety Broadband Licensee will be responsible for implementing the 700 MHz public safety nationwide interoperable broadband network".[243] The broadband network (using both public safety's 10 MHz and the commercial 10 MHz) will be funded and built by the commercial D Block licensee.

The FCC decided that the "upper 700 MHz D Block Licensee will gain access to the 700 MHz public safety broadband spectrum on a secondary preemptible basis through a spectrum leasing arrangement with the Public Safety Broadband Licensee."[244] The basis for such access will be negotiated between the commercial D Block licensee and the Public Safety Broadband licensee.

The public safety licensee, as prescribed by the FCC, is comprised of a broad range of organizations representative of non-Federal public safety interests. Under FCC rules, no

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Docket No. 00-32,Second Report and Order and Further Notice of Proposed Rule Making, 17 F.C.C.R. 3955, 3955 (2002).

[241] *See*, *Implementing a Nationwide, Broadband, Interoperable Public Safety Network in the 700 MHz Band; Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communications Requirements Through the Year 2010*, PS Docket No. 06-229, Second Report and Order, 22 F.C.C.R. 15289 (2007) (*Second Report and Order*). *See also*, Intelligence Reform and Terrorism Prevention Act of 2004, Pub.L. No. 108-458, § 7303, 118 Stat. 3638 (2004). *See also*, *FCC Revises 700 MHz Rules to Advance Interoperable Public Safety Communications and Promote Wireless Broadband Deployment,* FCC Press Release, http://fjallfoss.fcc.gov/edocs_public/attachmatch/DOC-275669A1.doc.

[242] *Second Report and Order,* at 1.

[243] *Id*. at 142.

[244] *Id*.

commercial interest may be held in or participate in the management of the Public Safety Broadband Licensee.[245]

Because there are some existing public safety narrowband systems in portions of the 700 MHz band, the FCC determined that narrowband operations now operating in channels 63 and 68 (and the upper 1 megahertz of channels 64 and 69) must be relocated no later than the DTV transition date of February 17, 2009.[246]

These existing narrowband systems will have to be relocated to accommodate the new band plan and ensure that the 700 MHz nationwide interoperable broadband system can be implemented as soon as possible by the D block licensee. The FCC determined that the Upper 700 MHz D Block commercial licensee will be required to pay the costs associated with relocating public safety narrowband operations to the consolidated channels, "in recognition of the significant benefits that will accrue to the D Block licensee".[247]

NON-FEDERAL SPECTRUM USE AND FUTURE SPECTRUM REQUIREMENTS

Spectrum Requirements Below 512 MHz for Communications in Rural Areas

Outside the major urban areas, most public safety agencies operate below 512 MHz because the long-range propagation characteristics of VHF make it much more cost-effective to cover larger areas with fewer antenna towers. Furthermore, in rural areas, there is often insufficient capacity on existing public safety VHF channels, and DHS has recommended the identification of additional frequencies for rural-area communications.

Improving Spectrum Efficiency by Narrowbanding

Narrowbanding increases spectral efficiency by using technological measures to transport the same wireless information in a percentage of the spectral bandwidth (typically fifty percent). DHS recommends narrowbanding below 512 MHz for voice and low-speed data applications.

Spectrum Requirements for Point-To-Point Microwave Radio Relay Backhaul Links

The availability to non-Federal public safety entities of 700 MHz band spectrum will encourage deployment of wide-area, multi-agency radio systems that may require expanded infrastructure. Such infrastructure is likely to include point-to-point fixed microwave communications links. The non-Federal public safety community does not currently have dedicated allocations in the 6 GHz, 10-11 GHz, 12 GHz, 18 GHz, or 21-23 GHz microwave bands. Microwave radio relay link backhaul communications provide inexpensive and effective long-distance communication, especially when land-line (wire) systems are disrupted in an emergency.

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[245] *Id*. at 144-146. *See also, Implementing a Nationwide, Broadband, Interoperable Public Safety Network in the 700 MHz Band*, PS Docket No. 06-229, Order on Reconsideration, 22 F.C.C.R. 17935 (2007); and *Order*, 22 F.C.C.R. 20453 (2007).

[246] *Id.* at 132.

[247] *Id.* at 133.

Therefore, DHS suggests that it would be useful for the FCC, in coordination with NTIA and DHS, to work with the public safety community to perform an assessment of current public safety point-to-point microwave use to evaluate anticipated growth and a potential need for additional public safety exclusive microwave spectrum, as well as opportunities for sharing microwave spectrum within the public safety community and between public safety and other users of point-to-point systems.

USING COMMERCIAL SERVICES FOR PUBLIC SAFETY

Public safety agencies require readily available spectrum in emergency situations. Commercial services have a tolerated a level of non-coverage in some areas and at some times. DHS therefore does not view commercial services as an effective solution for mission-critical public safety spectrum use. However, guidelines and resources to aid public safety agencies in identifying appropriate commercial applications could be useful. This may free up dedicated public safety spectrum for mission-critical functions.

LONG-RANGE STRATEGIC SPECTRUM PLANNING

Public safety telecommunications needs continue to grow as homeland security responsibilities increase. Therefore, the DHS, in coordination with the FCC and NTIA, will have a key role in providing guidance for non-Federal public safety agencies to prepare long-range strategic spectrum plans.

DHS also recommends conducting a comprehensive examination of public safety communications, comparable to the 1996 Final Report of the Public Safety Wireless Advisory Committee (PSWAC).[248] Further, in coordination with DOC and the FCC, DHS suggests that the PSWAC findings be reviewed in light of the changes that have occurred in the public safety environment over the past decade.

CONCLUSION

While additional spectrum in the 700 MHz band will be made available to state, local and tribal public safety entities pursuant the FCC's recent action, the benefits from the public-private partnership will take a number of years to be realized. In addition, a number of technical, operational, financial and political issues will need to be addressed as this system is implemented. However, the public safety community and the public at large could reap significant benefits from the responsiveness of the Congress and the FCC to the requirements for spectrum for broadband interoperable public safety communications.

However, more spectrum in and of itself will not solve all of the challenges facing non-Federal public safety communications. To respond to these challenges, the non-Federal public safety community is working to develop common standards for certain radio systems, implement new technologies, interconnect with other networks, including IP networks, and develop back-up systems. Increasingly, the non-Federal public safety community is coordinating these efforts

[248] PSWAC Report, *supra* note 13.

across jurisdictional boundaries. With the additional 700 MHz spectrum available for a nationwide interoperable broadband public safety system, state, local and tribal public safety entities should be able to develop interoperable systems (both narrowband and broadband) which significantly improve the communications capabilities needed to safeguard life and property.

FEDERAL PUBLIC SAFETY SPECTRUM NEEDS

CURRENT SPECTRUM USE AND FUTURE SPECTRUM REQUIREMENTS

The 162-174 MHz and 406.1-420 MHz bands, the two most heavily used Federal bands, are the primary public safety bands for Federal agencies.[249] The general use of these bands is discussed in more detail in the mobile and land mobile sections of Section B-1.

Most Federal agencies note that their departments rely on spectrum for public safety and interoperability purposes. Many agencies see an even greater future need for spectrum for these uses, but have not yet quantified these needs.

DOE expects that incident prevention and control will require UWB technology, in addition to land mobile radio systems, in the 162 MHz and 406.1 MHz bands to communicate with public safety.

DOJ sees the need for rapid response, and thus, unfettered spectrum access as situations dictate. DOJ needs the ability to set up mobile land mobile repeaters where a mission may require, without the need for embedded infrastructure. DOJ's use of nationwide land mobile frequencies may be justified in such cases.

As the USDA's operational support requirements increase, National Interagency Fire Center (NIFC) operations would be vastly improved with the permanent assignment of additional national frequencies. The NIFC is the nation's support center for wildland firefighting. Through the NIFC, seven Federal agencies, along with state foresters, work cooperatively to fight fires and provide other natural disaster relief across the country. The NIFC maintains a cache of handheld land mobile radios for use in large scale disaster relief.

The USDA keeps accurate records on the annual use of permanently assigned spectrum and frequencies temporarily assigned from other agencies. Every year the USDA engages in sophisticated planning for the upcoming fire season, using historical information and data from the drought index, weather, water, and snow-pack programs to anticipate resources, including radio frequencies. Traditionally, other Federal agencies provide USDA with temporary assignments to make up for shortfalls in permanent USDA frequency assignments. This impacts firefighting operations because off-the-shelf equipment configured to operate on USDA's permanently assigned frequencies often has to be reconfigured to operate on temporary frequencies before it can be deployed.

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[249] *Alternative Frequencies for Use by Public Safety Systems: Response to Title XVII, Section 1705 of the National Defense Authorization Act for FY2001*, U.S. Dep't of Commerce, NTIA Special Pub. 01-48 at 3-1 (Dec. 2001).