

**ALTERNATIVE FREQUENCIES  
FOR USE BY  
PUBLIC SAFETY SYSTEMS**

**Response to Title XVII, Section 1705 of the  
National Defense Authorization Act for FY2001**



**FEDERAL COMMUNICATIONS COMMISSION**

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**FEDERAL COMMUNICATIONS COMMISSION**

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**REPORT TO CONGRESS  
ON ALTERNATIVE FREQUENCIES  
AVAILABLE FOR USE BY PUBLIC SAFETY SYSTEMS**

Analysis of Non-Federal Government Spectrum  
Submitted by the Chairman of the Federal Communications Commission

Under the Communications Act of 1934, as amended, the Federal Communications Commission (Commission) has authority to assign frequencies to radio stations in the United States, its territories and possessions, except for those frequencies allocated to the Federal Government.<sup>1</sup> As a result, this Report provides the results of the Commission's staff analysis of non-Federal Government spectrum that would constitute alternative frequencies available for use by public safety systems in accordance with the mandate of Section 1705(c) of NDAA-01 as alternatives to the 138-144 MHz band. It should be noted that this Report does not address frequencies allocated exclusively to the Federal Government because such frequencies are not within the Commission's jurisdiction. Federal Government frequencies will be addressed in the companion Report of the National Telecommunications and Information Administration (NTIA).

This Report is divided into three sections. The first section provides a framework for an analysis of non-Federal Government spectrum responsive to the reporting requirement by examining the legislative history of Section 1705(c) of the NDAA-01. The second section discusses how to define "alternative frequencies" in the context of Section 1705(c) and identifies specific non-Federal Government spectrum that falls within the scope of such definition. The third section provides the results of an analysis of whether such alternative frequencies are available for use by public safety systems within the meaning of Section 1705(c).

Section 1705(c) of the National Defense Authorization Act For Fiscal Year 2001 (NDAA-01)<sup>2</sup> directs the Secretary of Commerce and the Chairman of the Commission to "jointly submit a report to Congress on alternative frequencies available for use by public safety systems." In this connection, Section 1705(a) of the NDAA-01 directs the Secretary of Defense to conduct an engineering study related to sharing of the 138-144 MHz band<sup>3</sup> and Section 1705(b) requires the Secretary of Defense to submit an interim report within one year of enactment of the statute.<sup>4</sup> The Commission currently authorizes public safety systems in various bands, particularly, the VHF and UHF bands between 30 and 1000 MHz. However, as discussed in greater detail herein, Congress intended for the Commission to identify alternative frequencies to the VHF frequencies located between 138 and 144 MHz given its emphasis on this band in subsection (a) of the statute. No other frequencies are mentioned. Thus, in considering frequencies for public safety systems, this Report will primarily focus on VHF frequencies administered by the Commission because these frequencies are most comparable to the 138-144 MHz band and are therefore, viable alternatives.

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<sup>1</sup> 47 U.S.C. §§ 151, 152, 902(b)(2)(A).

<sup>2</sup> Pub. L. No. 106-398; Title XVII, § 1705, 114 Stat. 1654 (2000).

<sup>3</sup> *Id.*

<sup>4</sup> *Id.*

## I. Section 1705(c) Analysis<sup>5</sup>

In developing a framework for this analysis of non-Federal Government spectrum in response to the Section 1705(c) mandate, it is important to consider Congress's intent with regard to three key terms – namely, “alternative frequencies,” “public safety systems” and “available for use.” As an initial matter, the NDAA-01 does not define these terms.<sup>6</sup> When a statute is silent or ambiguous with respect to particular definitions, the Commission may exercise its reasonable discretion in construing the statute, including referring to the statute's legislative history. The legislative history of Section 1705 of the NDAA-01 is silent regarding the intended meaning of the terms “alternative frequencies” and “public safety systems.” With respect to the term “available for use,” however, the legislative history does provide some guidance with respect to the intended meaning of this term.<sup>7</sup>

Alternative Frequencies. The intended meaning of the phrase “alternative frequencies” should not be determined in isolation, but is most appropriately gleaned from reading subsection (c) of Section 1705 in conjunction with the other subsections. Specifically, subsection (a) of Section 1705 discusses an engineering study of the 138–144 MHz band conducted by the Secretary of Defense.<sup>8</sup> In light of Congress's emphasis on the 138–144 MHz band in subsection (a) of the statute, Congress apparently intended for the Commission and Commerce Department to identify alternative frequencies to the 138-144 MHz band, particularly as no other frequencies are expressly mentioned in Section 1705.

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<sup>5</sup> Section 1705 is set forth below:

“SEC. 1705. REPORT ON PROGRESS ON SPECTRUM SHARING

(a) STUDY REQUIRED – The Secretary of Defense, in consultation with the Attorney General and the Secretary of Commerce, shall provide for the conduct of an engineering study to identify-

(1) any portion of the 138-144 megahertz band that the Department of Defense can share in various geographic regions with public safety radio services;

(2) any measures required to prevent harmful interference between Department of Defense systems and the public safety systems proposed for operation on those frequencies; and

(3) a reasonable schedule for implementation of such sharing of frequencies.

(b) SUBMISSION OF INTERIM REPORT – Within one year after the date of enactment of this Act, the Secretary of Defense shall submit to the Committee on Armed Services of the Senate and the Committee on Armed Services of the House of Representatives an interim report on the progress of the study conducted pursuant to subsection (a).

(c) REPORT – Not later than January 1, 2002, the Secretary of Commerce and the Chairman of the Federal Communications Commission shall jointly submit a report to Congress on alternative frequencies available for use by public safety systems.”

<sup>6</sup> See NDAA-01, § 1705.

<sup>7</sup> H.R. Conf. Rep. 106-945 (“Chairman of the Federal Communications Commission would also be required to submit a report to Congress on alternative frequencies that are, or could be made, available for use by public safety systems”).

<sup>8</sup> Pub. L. No. 106-398; Title XVII, § 1705(a). First, the engineering study must identify (1) specific geographic regions in which the Department of Defense (DOD) and “public safety radio services” can share portion(s) of the band. Second, the study must identify measures to prevent harmful interference between DOD systems and public safety systems proposed to operate on the band. Finally, the study must identify a reasonable implementation schedule to share the identified frequencies.

In addition, in its 1996 Report, the Public Safety Wireless Advisory Committee concluded that the 138-144 MHz band can potentially be used for public safety sharing among federal, state and local public safety service providers while acknowledging that the band was allocated exclusively for federal use.<sup>9</sup> Congress enacted the Balanced Budget Act of 1997 (BBA-97) which, *inter alia*, required the Secretary of Commerce to provide at least twenty megahertz of federal spectrum below 3 GHz to the Commission for allocation.<sup>10</sup> Pursuant to BBA-97, NTIA published a Spectrum Reallocation Report, which identified three megahertz of spectrum within the 138-144 MHz band (139-140.5 MHz and 141.5-143 MHz) for reallocation and assignment to non-federal users through the process of competitive bidding.<sup>11</sup> On October 5, 1999, Congress mandated that the President shall reclaim the three megahertz of spectrum in the 138-144 MHz band, identified in NTIA's Spectrum Allocation Report, for reallocation to exclusive Federal Government use.<sup>12</sup> The Conference Report accompanying this Act urged the Secretary of Defense to share such frequencies with state and local government public safety radio services.<sup>13</sup> Thus, based on the statute, in conjunction with the previous interest in the 138-144 MHz for public safety, it is concluded that the intended focus of Section 1705(c) is on spectrum administered by the Commission that is or could be considered a realistic alternative to the 138-144 MHz band.

Public Safety Systems. For purposes of this Report, the term "public safety systems" is to include, at a minimum, systems that support police, firefighting and emergency medical service (EMS) personnel, given that the underlying purpose of Congress's adoption of Sections 1701-1707 was to provide assistance to firefighters.<sup>14</sup> As a result, for purposes of complying with Section 1705(c) of the NDAA-01, the term "public safety systems" will be defined as wireless communications systems operated by State and local governmental entities (*e.g.*, police, fire, highway maintenance, forestry conservation and EMS) and by other non-governmental entities providing firefighting and emergency medical services.<sup>15</sup>

Available for Use. As noted above, in contrast to the terms "alternative frequencies" and "public safety systems," the legislative history to Section 1705(c) provides some guidance with respect to the meaning of the term "available for use." Specifically, the legislative history indicates that available for

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<sup>9</sup> *Public Safety Wireless Advisory Committee Final Report* at 58, Table 4-4-2 (rel. Sept. 11, 1996)(*PSWAC Final Report*).

<sup>10</sup> Pub. L. No. 103-66, Title III, § 3302(d), 111 Stat. 251, 262-63 (1997).

<sup>11</sup> *See Second Spectrum Reallocation Report*, NTIA Special Publication 98-36 (rel. February, 1998) (Final Reallocation Report). Pursuant to BBA-97, NTIA recommended several bands of frequencies that span not less than 20 megahertz located below 3 GHz.

<sup>12</sup> *See* Pub. L. No. 106-65, Div. A, Title X, § 1052, 113 Stat. 768 (1999). National Defense Authorization Act For Fiscal Year 2000 (NDAA-00).

<sup>13</sup> *See* Conference Report, H.R. Rep. No. 106-1052.

<sup>14</sup> H.R. Conf. Rep. 106-945 (Assistance to Firefighters (secs. 1701-1707)).

<sup>15</sup> BBA-97 modified the definition of public safety to encompass other types of users including, utilities and railroads. *See* Implementation of Sections 309(j) and 337 of the Communications Act of 1934 as Amended; Promotion of Spectrum Efficient Technologies on Certain Part 90 Frequencies; Establishment of Public Service Radio Pool in the Private Mobile Frequencies Below 800 MHz; Petition for Rule Making of the American Mobile Telecommunications Association, *Report and Order and Further Notice of Proposed Rule Making*, WT Docket No. 99-87, RM-9332, RM-9705, 15 FCC Rcd 22709 (1999). On December 21, 2000, Congress enacted legislation that requires NTIA to submit a report by December 21, 2001 on the current and future spectrum requirements of providers of energy, water and railroad services. *See* Pub. L. No. 106-553, 114 Stat. 2762 (2000). This Act requires the Chairman of the Commission to submit a report within six months after the release of the NTIA study on actions that could be taken by the Commission to address any of the needs identified in the NTIA study. *See id.* Thus, the spectrum needs of the entities discussed in this statute (*e.g.*, utilities and railroads) will be explored in an upcoming report.

use includes those frequencies that “are or could be made available.” In this connection, the clear intent of Congress is for the Commission and the Commerce Department to examine not only those frequencies that are presently available for use by public safety systems, but also those frequencies that could be made available. As a result, this analysis will encompass the entire range of frequencies administered by the Commission that can be characterized as alternative frequencies to the 138-144 MHz band and are or could be made available to public safety systems.

## II. Non-Federal Government Alternative Frequencies for Public Safety Systems

### A. *Potential Benefits for Public Safety Systems*

This section of the Report focuses on non-Federal Government bands that are or could be alternative frequencies under the NDAA-01. A critical first step in this inquiry is to determine what uses would be made of the 138-144 MHz band if non-Federal Government public safety systems were allowed to operate therein. In this regard, the record in the Commission’s ongoing public safety proceeding, WT Docket No. 96-86, provides some insight as to what types of uses were envisioned for the band by the public safety community.

By way of background, on September 29, 1998, the Commission released its Third Notice of Proposed Rule Making in WT Docket No. 96-86, wherein it sought comment on “the establishment of an interoperability<sup>16</sup> band in the 138-144 MHz band.”<sup>17</sup> The Commission also sought comment on “the practicality of providers of public safety services acquiring small, inexpensive radios that are capable of communicating in the 138-144 MHz band.”<sup>18</sup> In response to the *Third Notice*, commenters stated that in addition to interoperability, the 138-144 MHz band could be used for new technology, shared use wide-area systems and expansion of existing systems operating in the 150-174 MHz band.<sup>19</sup> In this regard, the Commission’s licensing records indicate that public safety entities most intensively use the frequencies lying between 150-174 MHz. By way of reference, surveys indicate that approximately 73% of all law enforcement entities<sup>20</sup> and 65-70% of all firefighting and EMS agencies<sup>21</sup> operate land mobile radio systems in the 100 to 300 MHz bands, which will be referred to as the “VHF high-band.” Based on the information received in response to the *Third Notice*, there would be two primary benefits associated with the potential operation of public safety systems in the 138-144 MHz band.

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<sup>16</sup> “Interoperability” is defined as “an essential communication link within public safety and public service wireless communications systems which permits units from two or more different entities to interact with one another and to exchange information according to a prescribed method in order to achieve predictable results.” 47 C.F.R. § 90.7.

<sup>17</sup> See Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Agency Communications Requirements through the Year 2010, WT Docket No. 96-86, *First Report and Order and Third Notice of Proposed Rulemaking*, 14 FCC Rcd 152, 239 ¶ 193 (1998) (*Public Safety First R&O*).

<sup>18</sup> *Id.*

<sup>19</sup> See, e.g., National Public Safety Telecommunications Council, Petition for Further Rulemaking to Allocate Spectrum in the 138-144 MHz Band for Public Safety, WT Docket No. 96-86/RM 9274, at 7-10 (Apr. 9, 1998) (NPSTC Petition); NPSTC Comments to the Third Notice of Proposed Rulemaking at 8-9, in WT Docket No. 96-86 (January 19, 1999); State of New York, Division of State Police Comments at 6-7, in WT Docket No. 96-86 (June 16, 1998); Association of Public-Safety Communications Officials-International, Inc. (APCO) Comments at 3, in WT Docket No. 96-86 (June 12, 1998); APCO Comments to the Third Notice of Proposed Rulemaking at 8-9, in WT Docket No. 96-86 (January 19, 1999).

<sup>20</sup> See National Law Enforcement and Correction Technology Center, *Wireless Communication and Interoperability Among State and Local Law Enforcement Agencies* Series, NCJ 168945, released January 1998, at 2.

<sup>21</sup> See Public Safety Wireless Network Program, *Analysis of Fire and EMS Communications Interoperability* (rel. April 1999) (*PSWN Analysis*). See also NPSTC Petition at 7, in WT Docket No. 96-86 (Apr. 9, 1998).

First, given that numerous public safety systems currently operate in the VHF high-band, other frequencies in the VHF high-band would appear to be ideal candidates that could be used to meet the public safety community's additional interoperability needs. In this connection, the Commission has designated five existing VHF high-band public safety channels for interoperability<sup>22</sup> and reallocated two VHF high-band maritime frequencies for public safety use in each of the thirty-three inland VHF Public Coast areas – for interoperability.<sup>23</sup> In addition, providing spectrum for interoperability close in proximity to those VHF frequencies currently employed in public safety systems would allow manufacturers to develop broadband radios capable of utilizing both existing and new public safety spectrum allocations.<sup>24</sup>

Second, the public safety community has expressed a desire to expand and/or upgrade its systems operating in the VHF high-band. As noted previously, the public safety community makes intensive use of the VHF high-band, which has resulted in such frequencies being extremely congested. For example, it has been reported to the Commission that congestion in the VHF high-band throughout the nation impedes efforts to identify and recommend new public safety assignments in the band without causing harmful interference to existing public safety systems.<sup>25</sup> In terms of upgrading and/or modernization of public safety systems, these results would most likely be accomplished by adding frequencies, implementing the repeater mode,<sup>26</sup> or converting to trunked operations.<sup>27</sup> Adding frequencies to current systems would allow public safety entities to implement complex (*i.e.*, using advanced technologies with voice and data capabilities) and/or wide-area systems in an effort to consolidate, enhance or expand their public safety communications. In this regard, the closer such additional frequencies are to those currently used in existing VHF public safety systems, the more likely it is that integration of such frequencies could be done in a cost-effective and expeditious manner. Implementation of the repeater mode in current public safety systems would greatly increase the communications range of mobile and hand-held units. It also would foster maximum operational efficiency by allowing systems to be located closer without resulting in harmful interference. Finally, trunked operations promote efficient spectrum use because idle channels are assigned on an as-needed basis, thus allowing for greater frequency re-use by public safety entities.

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<sup>22</sup> Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Agency Communications Requirements through the Year 2010, WT Docket No. 96-86, *Third Memorandum Opinion and Order and Third Report and Order*, 15 FCC Rcd 19844, 19883 ¶ 86 (2000).

<sup>23</sup> See Amendment of the Commission's Rules Concerning Maritime Communications, PR Docket No. 92-257, *Third Report and Order and Memorandum Opinion and Order*, 13 FCC Rcd 19853, 19868 ¶ 31 (1998) (*Maritime Third R&O*).

<sup>24</sup> See *PSWAC Final Report*; NPSTC Petition at 3, in WT Docket No. 96-86 (Apr. 9, 1998).

<sup>25</sup> See NPSTC Comments in WT Docket No. 96-86 (Apr. 9, 1998).

<sup>26</sup> See *e.g.*, National Law Enforcement and Corrections Technology Center, *Understanding Wireless Communications in Public Safety*, NCJ 180211, released August 2000, at 60-62 (August 2000 NLECTC Guidebook). "Repeater mode" refers to systems that operate with frequency pairs rather than using a single frequency. A repeater functions as an amplified relay station for base stations, mobile or hand-held units. Mobile units and hand-held units transmit on a repeater input frequency. The repeater retransmits the transmission from the mobile or hand-held unit on a repeater output frequency.

<sup>27</sup> When a radio system operates in the trunked mode it employs technology that provides the ability to search two or more available channels and automatically assign a user an open channel. See, *e.g.*, 47 C.F.R. § 90.7.

## **B. Characteristics of “Alternative Frequencies” Under the NDAA-01**

Below is a discussion of the specific characteristics of frequencies that would constitute meaningful alternatives to the 138-144 MHz band. As an initial matter, the non-Federal Government radio spectrum administered by the Commission spans from 9 kHz to 300 GHz.<sup>28</sup> Radio waves exhibit very different propagation characteristics depending on their frequency band. Consequently, engineers design radio systems to take advantage of the unique propagation characteristics of a given frequency band. Thus, based on the potential benefits described in Section II.A above, it appears that any spectrum identified as alternative frequencies must have the same or comparable propagation characteristics to that of the 138-144 MHz band.

The 138-144 MHz band is located in the higher portion of the VHF band. As a general matter, the propagation characteristics of VHF frequencies permit effective coverage of large geographic areas, in part because they are less susceptible to attenuation from trees and foliage. However, VHF frequencies are susceptible to natural and manmade noise, as well as, to the phenomenon known as “skip.” “Skip” occurs when a radio wave reflects off the ionosphere during the height of the sunspot cycle. Radio waves experiencing “skip” can travel a much greater distance than they would travel under normal propagation conditions.<sup>29</sup>

There are certain propagation distinctions between the VHF low-band frequencies (*i.e.*, 30 MHz to 100 MHz) and the VHF high-band frequencies. For example, VHF high-band frequencies are less susceptible to “skip” and manmade and natural noise. In addition, VHF high-band frequencies have the ability to diffract over hills and around other obstacles to reduce “dead” spots within the service areas. Moreover, VHF high-band frequencies are generally more effective at building penetration than VHF low-band frequencies. Due to their unique propagation characteristics, VHF high-band frequencies are often used for operations that require a single station to cover a large geographic area.

In addition, it appears that any spectrum identified as alternative frequencies should be in close proximity to the frequencies most intensely used in order to facilitate their integration into existing public safety systems and radio equipment in the most cost-effective, practicable, expeditious and technically feasible manner possible. Such an approach will foster realization of and mirror the potential public safety benefits associated with the operation of public safety systems in the 138-144 MHz band.

After consideration of the aforementioned characteristics of alternative frequencies for the 138-144 MHz band, it can be concluded that those alternative frequencies available for use by public safety systems should be limited to non-Federal Government frequencies in the VHF high-band. In reaching this view, all of the frequencies administered by the Commission were taken into consideration. The 9 kHz to 25 MHz bands, are not meaningful alternatives because there are no public safety allocations contained therein and the propagation characteristics of such frequencies vary significantly from those of the 138-144 MHz band. As indicated earlier in this Section II.B, radio systems must be designed to take advantage of the unique propagation characteristics of a given frequency band. For instance, the lower the frequency, the longer its wavelength. Thus, in order to maximize signal reception below 25 MHz, antennas must be designed relatively large in length.<sup>30</sup> These types of antennas are difficult to incorporate on a portable/mobile unit. Consequently, frequencies below 25 MHz are impracticable for land mobile operations.

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<sup>28</sup> See 47 C.F.R. § 2.101.

<sup>29</sup> In this regard, the phenomenon of skip can create interference problems between co-channel radio systems located many miles apart. As a result, the ability to re-use frequencies in different geographic areas is limited due to potential or actual skipping. See generally, August 2000 NLECTC Guidebook at 44-45.

<sup>30</sup> See, August 2000 NLECTC Guidebook at 44-45.

With respect to the frequencies in the 25 MHz to 30 MHz band, while there are public safety allocations contained therein, this band is not where the majority of public safety systems are located and it too has different propagation characteristics from those of the 138-144 MHz band.<sup>31</sup> These frequencies are less effective at penetrating buildings and more susceptible to skip interference, as well as, manmade and natural noise than frequencies ranging from 100 MHz to 300 MHz.<sup>32</sup> Thus, these frequencies also would not constitute alternative frequencies.

The VHF low-band frequencies,<sup>33</sup> which include some public safety allocations, have better propagation and lower loss to foliage than the 138-144 MHz band. However, compared to the 138-144 MHz band, they are generally worse at building penetration, are very susceptible to skip interference and experience a high level of manmade and natural noise.

With respect to frequencies in the 300 MHz to 3000 MHz bands, while they contain public safety allocations,<sup>34</sup> compared to the 138-144 MHz band, they experience the most loss due to trees and forests. Nonetheless, these frequencies have the best building penetration, no skip and the lowest level of manmade and natural noise. However, these frequencies are not in close proximity to the frequencies on which the majority of public safety systems currently operate. Hence, frequencies outside the 100 MHz to 300 MHz range do not exhibit the same or comparable characteristics of the 138-144 MHz band. Therefore, frequencies below 100 MHz and above 300 MHz are excluded from consideration as alternative frequencies to the 138-144 MHz band for the reasons stated herein.

### **III. Analysis of Alternative Frequencies Available for Public Safety Systems**

This section of the Report considers whether VHF high-band frequencies are or could be made available for public safety system use. The following chart (not to scale) is a general outline of the current non-Federal Government primary VHF high-band allocations.<sup>35</sup> As stated earlier, the NTIA Report will examine the spectrum allocated to the Federal Government.

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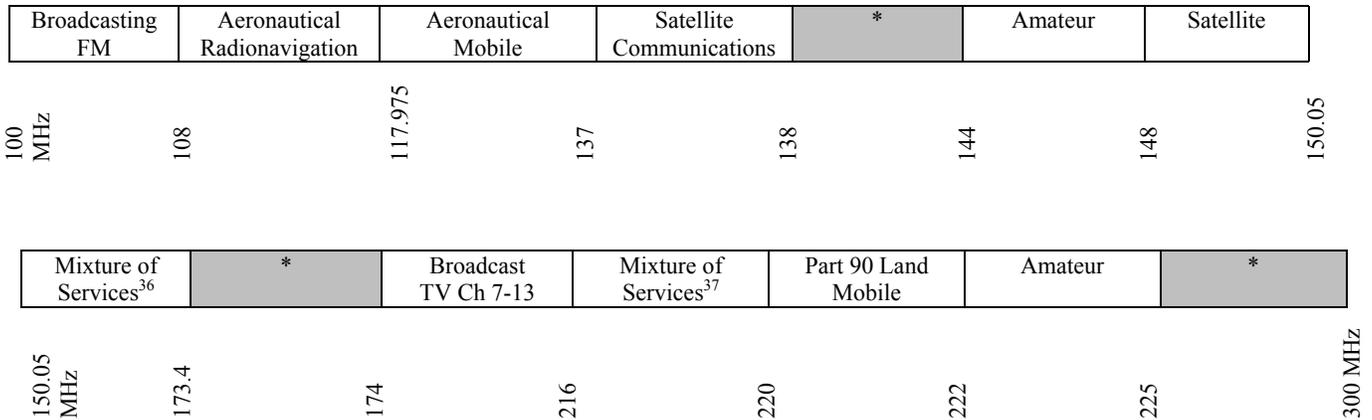
<sup>31</sup> *Id.*

<sup>32</sup> *Id.*

<sup>33</sup> The VHF low-band includes frequencies ranging from 30 MHz to 100 MHz.

<sup>34</sup> Public safety systems currently operate on frequencies outside the VHF band such as those contained in the 700 MHz and 800 MHz bands. As stated previously, Congress intended for the Commission to identify realistic alternatives to the 138-144 MHz band (*i.e.*, frequencies that are most analogous to those identified in the statute). The propagation characteristics of the 700 MHz and 800 MHz frequencies are not comparable to those contained between 138 and 144 MHz. Thus, it appears that identifying alternative frequencies in the 700 and 800 MHz band was not intended for purposes of this Report. In addition, the Commission reallocated 24 megahertz of spectrum in the 700 MHz band pursuant to 47 U.S.C. § 337 in 1998. Congress's decision not to note this directive in the NDAA-01 or accompanying conference report as a possible source of alternative frequencies to the 138-144 MHz band lends additional support to the conclusion that Congress intended for the Commission to seek possible alternative frequencies in spectrum with similar properties and characteristics, such as those located between 100 and 300 MHz.

<sup>35</sup> Attachment D contains a comprehensive table of frequency usage in the VHF high-band.



\* Federal Government spectrum

This analysis begins with an examination of the VHF high-band frequencies that are available for use by public safety systems. There are 3.6 megahertz of spectrum allocated for operation of public safety systems in the 150.05-173.4 MHz bands. Specifically, public safety entities currently operate land mobile radio systems in this band at 153.74-154.47875 MHz, 154.650-156.32475 MHz, 158.7225-159.4725 MHz, and 172-173.4 MHz. As noted herein, this spectrum is intensively used by public safety entities. Thus, it appears that there is not a sufficient amount of vacant spectrum in these bands to accommodate new and/or modernized public safety systems. Nonetheless, there may be some pockets of vacant spectrum in these bands, particularly in rural areas, that possibly could accommodate limited system expansion and modernization in these geographic areas. However, it appears that large-scale accommodation of new, expanded or upgraded public safety systems would not be possible in these bands, particularly in major urban areas. Generally, VHF high-band frequencies are very congested in the major urban areas where public safety systems are most needed. Furthermore, the remaining VHF high-band frequencies (*i.e.*, 150.05-173.4 MHz) are not currently available for use by public safety systems because, as indicated by the above chart, the frequencies are allocated or designated for different uses.

Consistent with the construction of the meaning of the term “available for use” in NDAA-01’s Section 1705(c), this analysis is completed by examining which, if any, VHF high-band frequencies could be made available for use by public safety systems. This analysis will consist of examining the non-Federal Government VHF high-band frequencies on a service-by-service basis to determine whether they could be made available for use to public safety systems. Arguably, the Commission has two options with regard to accommodating public safety systems on spectrum currently designated for other purposes. The Commission could: (1) reallocate spectrum and designate it for use by public safety systems either on a nationwide or geographic area basis; or (2) adopt rules to provide for frequency sharing between public safety services and incumbent non-public safety services. The following is an analysis of each of the VHF high-band frequencies and the incumbent services. In the discussion of each service, the feasibility of implementing both of these options in the subject VHF high-band frequencies is addressed. In the context of the discussion, the Report considers a variety of factors including the state of the current use of the band, relevant ongoing Commission proceedings, applicable statutory mandates, compatibility of current uses with traditional public safety communications, and impact on current licensee operations (including capital investments already made).

<sup>36</sup> Non-Federal Government services on these frequencies include Private Land Mobile (Part 90), Public Mobile (Part 22), Auxiliary Broadcasting (Part 74) and Maritime (Part 80). Parts of this band are also available to the Federal Government. *See* 47 C.F.R. § 2.106.

<sup>37</sup> The services on these frequencies include Maritime (Part 80), Private Land Mobile (Part 90), Personal Radio (Part 95) and Amateur (Part 97).

### ***Broadcast Bands (100-108 MHz and 174-216 MHz)***

The frequencies 100-108 MHz and 174-216 MHz are allocated internationally and domestically on a primary basis to the Broadcasting Service.<sup>38</sup> Domestically, the frequencies 100-108 MHz are used for FM broadcast,<sup>39</sup> while the frequencies 174-216 MHz are used for TV broadcast.<sup>40</sup> Internationally, these bands are allocated on a secondary basis for fixed and mobile services.<sup>41</sup> These bands are encumbered with both full power and low power FM and TV broadcast stations.

Reallocation. The reallocation of this spectrum to public safety use on a nationwide or certain geographic area basis would be extremely difficult and problematic. First, such reallocation would be inconsistent with the primary international allocation. The international allocations are designed to take into consideration several factors relating to the technical needs and characteristics of adjacent channel systems. Reallocating spectrum in a manner that is inconsistent with the primary international allocation may promote instances of harmful interference thereby jeopardizing border areas. Although the Commission is engaged in negotiations with other countries concerning the reallocation of spectrum at border areas, such efforts involve the development of extensive coordination procedures which is oftentimes a lengthy process that spans over the course of several years.

Second, a nationwide reallocation would entail identifying a new home for the displaced FM and TV broadcast stations. Comparable spectrum is not available to accommodate such a relocation. Third, there has been considerable investment by both the FM and TV broadcast licensees operating in these bands and the general public in the facilities and equipment associated with existing broadcast operations. Arguably, any reallocation and associated relocation of the broadcast operations would result in increased costs to the public. In addition to the additional cash outlays that would be required for equipment replacement, reallocation of broadcast operations would interfere with the public's television and radio viewing and listening choices. Fourth, reallocating the TV and FM bands would be difficult due to the significant number of incumbents. For example, congestion in the TV band has increased because the TV broadcast band was reduced in size as a result of the transition from analog to digital television. Specifically, all TV stations must eventually operate on the "core"<sup>42</sup> TV channels 2-51. Congestion in the TV "core" is further aggravated because every full power station operates with a second digital channel and low power TV stations fill in areas where a higher power station cannot be accommodated.

Sharing with Public Safety Systems. Given the nature of the broadcast operations on the VHF high-band frequencies that are designated for such use (*i.e.*, 100-108 MHz and 174-216 MHz), particularly the power levels associated with these operations, sharing with public safety systems would not be feasible. The maximum power levels of these systems are as high as 316 kW.<sup>43</sup> This power level will serve a large geographic area from a single site and thereby affect adjacent channel operations. Moreover, as a general matter, these operations are incompatible. For example, broadcast transmissions are intended for direct public reception whereas public safety communications are intended to be internal to public safety personnel.

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<sup>38</sup> 47 C.F.R. § 2.106. The Broadcasting Service is a radio communication service in which the transmissions are intended for direct reception by the general public. This service may include sound transmissions, television (TV) transmission or other types of transmissions. *See* 47 C.F.R. § 2.1. These frequencies are used for television, FM radio and auxiliary broadcasting.

<sup>39</sup> FM Channels 261-300. *See* 47 C.F.R. § 73.201.

<sup>40</sup> TV Channels 7-13. *See* 47 C.F.R. § 73.603.

<sup>41</sup> *See* 47 C.F.R. § 2.106.

<sup>42</sup> "Core" channels refer to the channels that will remain available for TV broadcasting after the reallocation of TV channels 52-69 for other wireless communications services.

<sup>43</sup> *See, e.g.*, 47 C.F.R. § 73.614.

Further, based on past experience in other broadcast bands where broadcast and land mobile radio operations share frequencies, such sharing has been accommodated by identifying specific areas in which one type of operation would be primary and entitled to interference protection vis-à-vis the other type of operation.<sup>44</sup> This type of public safety sharing would be difficult in FM and TV frequencies because both bands are extremely congested in major metropolitan areas where public safety systems are most needed. For example, in the FM band, the Commission informs potential applicants for the low power FM service that certain urban areas such as New York, Los Angeles and Chicago are already so congested with full powered FM stations that there may be no room for additional stations.<sup>45</sup> In the TV band, congestion exists today because every full power TV station is assigned two TV channels. A second channel is assigned to each full-service television licensee in the country to facilitate the transition from analog to digital television. In addition, primary lower powered TV stations fill in areas where a higher power station cannot be accommodated.<sup>46</sup>

Public safety entities currently share, on a geographic basis, TV Channels 14-20 (470-512 MHz).<sup>47</sup> Pursuant to a sharing arrangement, developed in 1970, certain TV channels are assigned for exclusive land mobile use to major metropolitan cities.<sup>48</sup> Nonetheless, it would be difficult to extend this sharing arrangement to VHF high-band TV frequencies due to the transition from analog to digital TV. The possibility of sharing is essentially eliminated in the TV broadcast bands. In addition, in light of the incompatibility of broadcast and public safety operations, it is unlikely that accommodating public safety systems by allowing them to operate on a secondary basis would be meaningful because there would be a significant likelihood that such systems would experience harmful interference.<sup>49</sup>

#### ***Aviation Bands (108-137 MHz)***

The frequencies 108-137 MHz are allocated internationally and domestically on a primary basis for the Aviation Radio Service. Specifically, the frequencies 108-117.975 MHz are used for aeronautical radionavigation<sup>50</sup> and the frequencies 117.975-137 MHz are used for aeronautical mobile operations.<sup>51</sup>

Reallocation. Similar to the analysis of the broadcast bands, it appears that reallocation would be

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<sup>44</sup> See 47 C.F.R. Part 90, Subpart L (frequencies 470-512 which include TV channels 14-20).

<sup>45</sup> See Low Power FM Radio: An Applicant's Guide at <http://www.fcc.gov/mmb/prd/lpfm/lpfmguide.pdf>.

<sup>46</sup> Low power TV stations operating on a primary basis are known as Class A TV stations. See 47 C.F.R. Part 74, Subpart G.

<sup>47</sup> 47 C.F.R. § 90.301.

<sup>48</sup> For example, TV Channels 14 and 15 are assigned to the New York/Northeast New Jersey area. See 47 C.F.R. § 90.303.

<sup>49</sup> For instance, the Commission's rules require low power TV stations to protect land mobile stations on certain channels in specific geographic areas from potential harmful interference. See 47 C.F.R. § 74.709. In addition, the Commission's rules require full power TV stations and land mobile stations to protect one another from harmful interference. See *Further Sharing of the UHF Television Band by Private Land Mobile Radio Services, Notice of Proposed Rulemaking*, Gen. Docket No. 85-172, 101 FCC 2d 852 (1985), cited in *Application of Goosetown Enterprises, Memorandum Opinion and Order*, 16 FCC Rcd 12792 (2001); see also 47 C.F.R. §§ 90.305(a), (b), 307, 309.

<sup>50</sup> Radionavigation is the use of radiodetermination for the purpose of navigation, including obstruction warning. See 47 C.F.R. § 87.5.

<sup>51</sup> The Aeronautical Mobile Service is a mobile service between aeronautical stations and aircraft stations, or between aircraft stations, in which survival craft stations may participate; emergency position-indicating radiobeacon stations may also participate in this service on designated distress and emergency frequencies. See 47 C.F.R. § 87.5.

extremely problematic for the aviation bands and is not a viable option. First, such reallocation would appear to conflict with the primary international allocation. As discussed previously, this Report finds that reallocating spectrum in a manner that is inconsistent with primary international allocations may jeopardize transmissions at the border areas. Second, there is the concern that reallocation of this spectrum could adversely affect air safety, both internationally and domestically. For instance, aviation frequencies generally are used for communications with aircraft in flight and such communications can be received over a wide geographic area due to the height of the aircraft's receive antenna above ground. Further, transcontinental air travel requires that spectrum be allocated consistent with international allocations to avoid endangering air travel safety. In light of the September 11, 2001 terrorist attacks, it is important to recognize the integrity of aviation communications. In this connection, land mobile radio operation on such frequencies could cause harmful interference to such aviation-related communications and thus compromise the safety of air travel. Third, given the use of the aviation bands on an international and nationwide basis, discrete geographic areas to accommodate use by public safety systems do not appear to exist, particularly given the wide area over which aviation communications travel and are potentially received by aircraft. Fourth, reallocation would entail identification of replacement spectrum and reconfiguration and/or replacement of aircraft radio equipment. Finally, reallocation would disrupt and jeopardize these essential services. Moreover, reallocation would require current aviation communications operators to modify their systems and to incur the costs associated with disruption resulting from relocation. In this regard, this Report finds that reallocation is not in the public interest.

Sharing with Public Safety Systems. Sharing between the aviation radio communications being conducted in this band and the envisioned public safety communications would not be feasible. Specifically, the two types of communications do not appear to be sufficiently compatible to occur on the same frequencies in the same frequency bands. In addition, given the wide area requirements of the aviation radio communications occurring in this band, discrete geographic areas where there would not be a potential for harmful interference either to the aviation-related communications or the public safety communications do not appear to exist. Thus, it appears that such sharing would adversely affect aviation radio communications and/or public safety communications.

#### ***Satellite Services (137-138 MHz and 148-150.05 MHz)***

The frequencies 137-138 MHz and 148-150.05 MHz are allocated domestically and internationally for Satellite Services. The 137-138 MHz and 148-150.05 MHz bands are used by the Low-Earth Orbit ("Little LEO") Non-Voice, Non-Geostationary Mobile Satellite Service (NVNG MSS).<sup>52</sup> Little LEOs use small satellites at approximately 600 miles altitude to provide data communications.<sup>53</sup>

Reallocation. The reallocation of these bands is not a viable option. Again, such reallocation would be inconsistent with the international allocation of these frequencies and, thus, may adversely affect international operations. Further, international agreements would allow satellites licensed by other countries to transmit while in the United States, thus potentially causing interference to terrestrial services in this band. Additionally, a domestic reallocation of these spectrum bands may potentially adversely affect efforts of Little LEO licensees and applicants to pursue development of new services.

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<sup>52</sup> "Little LEO" is a non-voice, non-geostationary mobile-satellite service. See 47 C.F.R. §§ 2.106, 25.202(a)(3). In addition, the National Aeronautics and Space Administration operates two geostationary weather satellites and one non-geostationary (NGSO) weather satellite in both bands. A second NGSO weather satellite operates in the 137-138 MHz band. Also, the Federal Government operates five NGSO satellite systems at 137-138 MHz.

<sup>53</sup> NVNG MSS applications include vehicle tracking and monitoring, environmental data collection, maritime safety communications, electronic mail, meter reading, and security alerting.

Sharing with Public Safety Systems. Similarly, sharing between the satellite services in this band and public safety systems would not be feasible. As a general matter, sharing between non-stationary low orbiting satellite systems and public safety land mobile radio systems likely could be implemented in this band only if the two types of systems were confined to separate geographic areas or if there is some form of band segmentation. In this connection, land mobile radio transmitters are typically omni-directional and thus would desensitize any satellite receivers in the near vicinity. Additionally, the satellites would be a potential source of harmful interference to the receivers for public safety land mobile radio systems, either at the base stations, the mobile units or remote locations. Hence, the sharing option is further complicated by the ubiquitous fly-over nature of the multi-satellite systems operating in the bands. A further concern is the unlimited operational area of associated Little LEO earth stations combined with the roaming ability of the mobiles associated with public safety systems. Given the nature of both of these operations, the coordination of the two diverse types of systems would be both very difficult and costly to achieve without substantial concomitant public interest benefits.<sup>54</sup>

### ***Amateur Bands (144-148 MHz and 222-225 MHz)***

The frequencies 144-148 MHz band (commonly referred to as the 2 Meter (m) band) and the 222-225 MHz band (commonly referred to as the 1.25m band) are allocated domestically and internationally for the Amateur Radio Service. Over 600,000 amateur service licensees are authorized to transmit any of 1300 emission types in these bands. Under the Commission's licensing approach for the Amateur Radio Service, licensees are assigned specific frequencies but are authorized to use any available channel in the amateur bands if they have met the requisite eligibility requirements.

The 2m band is the most heavily used Amateur Radio Service band. It is used extensively for digital (packet radio) communication networks and systems, repeaters, and satellite uplinks and downlinks, in part because these frequencies are allocated to the Amateur Radio Service on a primary exclusive basis in the international *Radio Regulations*. Almost all amateur service VHF transceivers include this band as a standard feature.

The 1.25m band is authorized to all 700,000 Amateur Radio Service licensees. It is used for single band and cross-band repeaters, control links for 2m repeaters, weak signal communications, meteor communications, satellite uplinks and downlinks and digital communications. In 2001, amateur radio equipment manufacturers began marketing tri-band amateur radio equipment that includes the 1.25m band.

Reallocation. Upon reviewing the nature and extent of the amateur radio operations in the 2m and 1.25m bands, reallocation of this spectrum for public safety systems does not appear to be practical. Such reallocation would be inconsistent with international spectrum allocations and, as a result, would potentially cause significant disruption to amateur radio operations not only domestically but also internationally. Similarly, these amateur frequencies cannot be reallocated in specific geographic areas for public safety systems because, as noted above, the Amateur Radio Service is not licensed on a site-specific basis and amateur radio licensees, both domestically and internationally, use the frequencies throughout the United States. Therefore, there are not many, if any, locations to find that the 2m and 1.25m bands are sufficiently underutilized to warrant reallocating such spectrum for public safety systems on a geographic basis without fear of adversely affecting amateur radio communications.

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<sup>54</sup> While in certain circumstances it may be possible to incorporate and share with point-to-point microwave public safety facilities, given the inherent shielding from satellites and general nature of such fixed operations, effective and successful coordination with ubiquitous earth stations would still be difficult. Public safety systems that are the subject of this Report would be land mobile radio systems rather than point-to-point fixed microwave systems.

Sharing with Public Safety Systems. Similarly, public safety systems could not share this band with the amateur radio community, primarily due to the nature and licensing of amateur radio communications. Sharing would be problematic given the current international spectrum allocation for these bands. In addition, the public safety community already derives certain indirect benefits from the amateur radio community's use of these bands. For example, amateur radio operators often use the frequencies to transmit messages for and/or to public safety entities during emergencies, including but not limited to, hurricanes, earthquakes, tornadoes, floods, motorist accidents, fires, chemical spills, and search and rescue missions.

### ***Mixed Service Bands (150.05-173.4 MHz and 216-220 MHz)***

The frequencies 150.05-173.4 MHz are allocated internationally and domestically for fixed and mobile terrestrial services. The 216-220 MHz band is allocated internationally and domestically for fixed, maritime, mobile and radiolocation services. The Commission currently accommodates a variety of services in these bands, on the frequencies available for non-Federal Government use. What follows is an examination of the non-Federal Government 150.05-173.4 MHz, and the 216-220 MHz bands individually.

#### **150.05-173.4 MHz Band**<sup>55</sup>

The 150.05-173.4 MHz band is used for private land mobile radio services,<sup>56</sup> public mobile radio services,<sup>57</sup> maritime radio services<sup>58</sup> and auxiliary broadcasting.<sup>59</sup> As an initial matter, the Commission already has conducted auctions for licenses for some of the services accommodated in this band. For instance, on October 30, 2001, the Commission conducted an auction for the nationwide licensing of the public mobile radio services frequencies in this band. These authorizations will allow licensees to provide public mobile radio services in Commission-defined geographic areas. In addition, on December 3, 1998 and June 6, 2001, the Commission conducted auctions for the nationwide licensing of the maritime radio services in the 150.05-173.4 MHz band. These authorizations allow licensees to provide maritime radio services in Commission-defined geographic areas. To date, the Commission has granted 37 geographic area public coast station licenses in this band.

Reallocation. Reallocation of these frequencies to accommodate public safety systems would not appear to comport with efficient and effective spectrum management in light of the current licensing and operations in the band. First, a reallocation of frequencies that have been assigned by competitive bidding would result in the displacement of the auction winners. Specifically, such displacement would, at a minimum, require identification and licensing of replacement spectrum as well as impact the business and operational plans of the auction winners. These consequences would cause significant disruption to and increased costs on both licensees and their customers without substantial concomitant public interest benefits. Second, the same reasons discussed in the context of the broadcast bands *supra*<sup>60</sup> apply equally to this band with respect to the auxiliary broadcasting operations in this band. Third, there are numerous non-public safety systems operating in this band and a reallocation would entail a massive relocation of such operations that are currently done on a shared basis. Given the nature and quantity of these

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<sup>55</sup> As noted and discussed previously herein (*see supra*, page 8), public safety systems currently operate in this band as private land mobile radio services.

<sup>56</sup> Frequencies 150-170 MHz. *See* 47 C.F.R. §§ 90.20 and 90.35.

<sup>57</sup> Frequencies 152-159 MHz. *See* 47 C.F.R. §§ 22.561 and 22.725.

<sup>58</sup> Frequencies 156-162 MHz. *See* 47 C.F.R. § 80, Subpart H.

<sup>59</sup> Frequencies 152-162 MHz. FM and TV stations use these frequencies to broadcast from remote locations away from the main studio. *See* 47 C.F.R. § 74.402.

<sup>60</sup> *See supra*, pages 9-10.

operations, and the unavailability of alternative spectral resources, such allocation would not be feasible given the significant burdens and costs associated with this action. Rather, the public interest would be better served by continuing to promote the efficient and effective use of the band for private land mobile radio systems. Further, the reallocation of the bands to public safety systems in certain geographic areas should not be pursued for the same reasons that a nationwide reallocation of the subject bands is not feasible.<sup>61</sup>

Sharing with Public Safety Systems. Upon reviewing the variety of services currently present in this band, the most viable candidate for sharing with public safety systems is on the frequencies used for private land mobile radio systems. In this connection, the Commission's rules already provide a mechanism by which public safety entities could gain access to these frequencies. As a general matter, applicants seeking to obtain a license for these frequencies must satisfy certain eligibility requirements. If an applicant does not meet the requisite eligibility requirements, it can then seek a waiver of the Commission's rules as part of its application. In addition, Part 90 of the Commission's rules provides that public safety entities can be users on non-public safety systems, even if the public safety entities are not independently eligible for licensing on such frequencies.<sup>62</sup> Although this is an option, frequency sharing between public-safety and non-public safety systems will not adequately supplement the spectrum that is currently assigned to public safety systems. First, as noted previously, these frequencies are intensively used by non-public safety entities; thus, there is a limited amount of vacant spectrum, particularly in the urban areas. Second, when there is sharing between public safety and non-public safety systems, such arrangements often support restricted and/or less critical public safety operations.<sup>63</sup> It appears that Congress intended for the "alternative frequencies" to have the capability to support a full-range of public safety applications. Furthermore, the limited sharing that could and would take place between public safety and non-public safety systems would not allow for the requisite operational flexibility needed to support a broad range of public safety operations that permit voice and data transmissions.<sup>64</sup>

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<sup>61</sup> Prior to the auction of the public coast geographic area licenses in the band, the Commission reallocated certain maritime frequencies for public safety use at inland areas. *See Maritime Third R&O*, 13 FCC Rcd at 19899-19900 (Appendix E). The Commission ultimately designated these frequencies for interoperability use. *See Public Safety First R&O*, 14 FCC Rcd at 236 ¶ 189.

<sup>62</sup> *See* 47 C.F.R. § 90.179(h). Some public safety entities have elected to enter into such arrangements with non-public safety systems and that such arrangements do not have to be confined to the VHF high-band.

<sup>63</sup> For instance, the VHF high-band contains a few locations where public safety and non-public safety service providers have access to the same frequencies, such as the 173.2-173.4 MHz bands. However, the operation parameters are highly restricted. The 173.2-173.4 MHz band is restricted to remote control and telemetry (mainly data) transmissions. Because public safety operations involve a variety of operational modes (*e.g.*, voice and data), and need reliable spectral resources, additional channel sharing among public safety and non-public safety services would not necessarily serve the public interest. Hence, such instances should remain isolated.

<sup>64</sup> *See, e.g.*, PSWN Analysis at 11. A survey posed to the fire and EMS communities reveals an increase in demand to implement non-voice land mobile radio capabilities, such as mobile data computing, imagery (still photos and live video), and geographic information systems.

## 216-220 MHz Band

Frequencies in the 216-220 MHz band are allocated under Part 95 to the Low Power Radio Service (LPRS)(216-217 MHz),<sup>65</sup> Automated Maritime Telecommunications Systems (217-218 MHz and 219-220 MHz);<sup>66</sup> the Low Power Radio Service (LPRS); and the 218-219 MHz Service.<sup>67</sup> The band is also available on a secondary basis under Part 90 for telemetry<sup>68</sup> and wildlife/ocean buoy tracking<sup>69</sup> and under Part 97.<sup>70</sup>

Reallocation. The Commission recently considered allocations in the 216-220 MHz band and it appears that there is little room for new capacity in this band because it is heavily encumbered, thus limiting opportunities for new licensing.<sup>71</sup> Based on a review of the comments received by the Commission in the proceeding, the public safety community has not expressed an interest in operating public safety systems in this band. One reason public safety entities may not be interested in this band is the fact that TV channel 13 (210-216 MHz) is allocated in spectrum adjacent to this band. The lower portion of the 216-220 MHz band, particularly the 216-217 MHz, requires operation at lower power levels to avoid causing interference to operations to TV channel 13. While the 216-220 MHz band does not directly support public safety services, some of the services in the band, in particular LPRS, serve important public needs. For instance, LPRS supports auditory assistance devices, as well as currency tracking.<sup>72</sup>

Sharing with Public Safety Systems. As noted previously, having to operate in a shared environment (public safety sharing with non-public safety) often drastically limits the type of communication systems that can be used by public safety entities (restricts operational flexibility).<sup>73</sup> For example, it would be difficult to use the spectrum for interoperability. Also, public safety entities tend to put less critical communications on spectrum that is shared with non-public safety entities.

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<sup>65</sup> 47 C.F.R. § 95.1001. LPRS is a private, short-distance communication service operating in the 216-217 MHz portion of the band. LPRS provides auditory assistance to persons with disabilities, health care assistance for the ill, law enforcement tracking services in cooperation with law enforcement and point-to-point network control for AMTS coast stations.

<sup>66</sup> See 47 C.F.R. § 80.475. AMTS is an integrated and interconnected maritime communications system operating in the 217-218 MHz and 219-220 MHz portions of the band.

<sup>67</sup> See 47 C.F.R. § 95.801. The 218-219 MHz Service (formerly Interactive Video Data Service) is a two-way radio service that allows licensees to provide communications services to subscribers in specific areas.

<sup>68</sup> 47 C.F.R. § 90.259.

<sup>69</sup> 47 C.F.R. § 90.248.

<sup>70</sup> 47 C.F.R. § 97.303. The Amateur Radio Service is authorized to operate in the 219-220 MHz segment of the band secondary to AMTS. Amateur use of the 219-220 MHz segment is limited to stations participating as forwarding stations in point-to-point fixed digital message forwarding systems.

<sup>71</sup> See Reallocation of the 216-220 MHz, 1390-1395 MHz, 1427-1429 MHz, 1429-1432 MHz, 1432-1435 MHz, 1670-1675 MHz, and 2385-2390 MHz Government Transfer Bands, ET Docket No. 00-221, *Report and Order and Memorandum Opinion and Order*, FCC 01-382 (rel. Jan. 2, 2002), at 10 ¶ 18 *citing* Principles for Reallocation of Spectrum to Encourage the Development of Telecommunications Technologies for the New Millennium, *Policy Statement*, 14 FCC Rcd 19868 (1999).

<sup>72</sup> See Amendment of the Commission's Rules Concerning Low Power Radio and Automated Maritime Telecommunications System Operations in the 216-217 MHz Band, WT Docket No. 96-56, *Report and Order*, 11 FCC Rcd 18517 (1996).

<sup>73</sup> See *supra*, page 14.

### *The 220-222 MHz Service (220-222 MHz)*

In the VHF high-band, the frequencies 220-222 MHz are allocated domestically for fixed and land mobile services. The 220-222 MHz Service, which provides for dispatch of vehicle fleets and business and maintenance communications, operates in this band.<sup>74</sup> The Commission first established this service in 1988. The 220-222 MHz Service was somewhat lightly used until 1998, when the Commission auctioned licenses on a national, regional and local basis.

Reallocation. Nationwide reallocation of 220-222 MHz Service frequencies for exclusive use by public safety entities is not a viable option. For the same reason indicated in previous sections, licensees have invested a great deal of capital in this service. For instance, bidders invested \$21 million at the 1998 auction to obtain 220-222 MHz Service licenses. In addition, the reallocation of 220-222 MHz Service frequencies in specific geographic areas for public safety use is not a viable option. The 1998 auction filled in underserved areas with 220-222 MHz licensees particularly in major urban areas.<sup>75</sup> It is not necessarily in the public interest to reallocate these frequencies for exclusive use by public safety entities so soon after an auction. Licensees have made considerable investments and are currently developing systems for use in this spectrum. In light of this, reallocation and associated relocation of these operations would be very difficult as well as inequitable to the current licensees.

Sharing with Public Safety Systems. As noted above, this band was the subject of a Commission auction.<sup>76</sup> Generally, making auctioned spectrum available to others after the competitive bidding process has been completed and licenses granted could drastically impact the auction winners and adversely affect the integrity of the Commission's auction process. Further, as noted above, public safety sharing with non-public safety restricts the operational flexibility of public safety communication systems. Consequently, this band would not be a good candidate for an alternative to the 138-144 MHz band.

#### **IV. Conclusion**

In analyzing the non-Federal Government spectrum administered by the Commission consistent with the NDAA-01, the Report concludes that the VHF high-band constitutes alternative frequencies to the 138-144 MHz band for public safety systems because it offers propagation and other technical characteristics most analogous to those of the 138-144 MHz band. After reviewing the specific allocations of and current operations present in the VHF high-band, the Report determines that reallocating spectrum from the VHF high-band would disrupt incumbent services. Moreover, the Report finds that the spectrum is intensively used, some already by public safety systems, and that there are no additional frequencies therein that are available for use by public safety systems.

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<sup>74</sup> The 220-222 MHz Service is a narrowband voice and data service.

<sup>75</sup> See Phase II - 220 MHz Service Auction Closes, Public Notice 98-2143 (rel. Oct. 23, 1998).

<sup>76</sup> *Id.*

# ATTACHMENT A

## Summary of Spectrum Currently Used for Public Safety Below 900 MHz

Frequency Band (MHz)	Megahertz (Approximate)
25-50 (VHF Low Band)	6.3
150-174 (VHF High Band)	3.6
220-222 (220 Band)	0.1
450-470 (UHF Band)	3.7
764-776/794-806 (700 Band)	24
806-821/851-866 (800 Bands)	3.5
821-824/866-869 (NPSPAC Band)	6
TOTAL	47.2

Note: Two VHF Public Coast channel pairs are available in each Inland VHF Public Coast area for interoperability communications. Spectrum in the 421-430 MHz band is available for public safety operations in three urban areas. *See* 90.273. Spectrum in the 470-512 MHz band (UHF-TV sharing) is available for public safety operations in eleven urban areas. *See* 47 C.F.R. 90.303.

# ATTACHMENT B

## A Summary of Commission Recent Public Safety Actions

### New Public Safety Spectrum Designations

- In the *First Report and Order* in WT Docket No. 96-86 the Commission allocated 24 megahertz of spectrum in the 700 MHz band exclusively for public safety operations.
- In *Report and Order* in WT Docket No. 97-81 the Commission designated five 12.5 kHz channel pairs in the 932/941 MHz band for exclusive public safety use.
- In the *Third Report and Order* in PR Docket No. 92-257 the Commission designated two VHF public coast channel pairs in each Inland VHF Public Coast areas for interoperability communications.

### Other Actions

- In the Public Safety 700 MHz proceeding (WT Docket No. 96-86), the Commission adopted a number of rules to provide for a number of public safety requests such as interoperability, high speed data, equipment standards and low power on-scene communications.
- In the *Second Report and Order* in WT Docket No. 96-86, the Commission permitted commercial mobile radio service providers to offer Priority Access (PAS) to public safety entities.
- In the Commission's "Refarming Proceeding" (PR Docket No. 92-235) the Commission adopted an overall strategy to improve the efficiency of spectrum use in the private land mobile radio service allocations below 512 MHz (which includes public safety) to help meet future communication requirements.
- The Commission has granted five Section 337 waiver requests since the year 2000, to allow public safety entities to use spectrum that is not specifically allocated for public safety operations. *See, e.g., Du Page Public Safety Communications, Memorandum Opinion and Order*, 16 FCC Rcd 12394 (WTB PSPWD 2001).
- In the *Report and Order* in WT Docket No. 98-182, the Commission adopted rules to allow, under certain conditions, public safety licensees to share their radio facilities with Federal Government entities and for Industrial/Business licensees (*e.g., utility companies*) to share their radio facilities with public safety entities.
- The Commission has commenced an audit of the construction and operational status of private land mobile stations operating on frequencies below 512 MHz, which includes public safety. Completion of this audit will lead to recovery of underutilized public safety channels for other public safety use.
- The Wireless Telecommunications Bureau organized an industry/public safety working group to tackle interference problems in the 800 MHz band between commercial and public safety users. The group developed a "Best Practices Guide" for the 800 MHz band. Nextel recently submitted a "white paper" on the problem which is under review.

# ATTACHMENT C

## Commission Actions Furthering The Development of Public Safety Systems

### 2001

- The Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communications Requirements Through the Year 2010, WT Docket No. 96-86, *Fourth Report and Order and Fifth Notice of Proposed Rulemaking*, 16 FCC Rcd 2020 (2001). 4<sup>th</sup> R&O adopts most of the NCC's recommendations regarding use of Interoperability channels. Establishes a "safe harbor" so that public safety entities in vast geographic areas of the Nation unencumbered by television broadcasters can enter the 700 MHz band immediately. 5<sup>th</sup> NPPM seeks comments on the appropriate migration path to 6.25 kHz spectrally efficient technology on the 700 MHz General Use channels.
- Amendment of Part 90 of the Commission's Rules and Policies for Applications and Licensing of Low Power Operations in the Private Land Mobile Radio 450-470 MHz Band, *Notice of Proposed Rulemaking*, WT Docket No. 01-146, 16 FCC Rcd 14946 (2001). Seeks comment on proposals related to low power operations in the 450-470 MHz band.
- Amendment of Section 90.20(e)(6) of the Commission's Rules to Revise the Authorized Duty Cycle on 173.075 MHz, WT Docket No. 01-97, *Notice of Proposed Rulemaking*, 16 FCC Rcd 9998 (2001). Seeks comment on revising the authorized duty cycle for stolen vehicle recovery system (SVRS) operations on 173.075 MHz.
- Wireless Telecommunications Bureau Seeks Comment Regarding Intelligent Transportation System Applications Using Dedicated Short Range Communications, *Public Notice*, 16 FCC Rcd 6764 (WTB 2001). The item sought comment on a report filed by ITS America concerning service rules for the 75 MHz that were allotted to Intelligent Transportation Systems. ITS intends to make the highways safer, to send emergency information faster and more reliably after an accident happens, to prevent collisions, and to collect and distribute other transportation related data for more efficient and safer transportation of people and goods.
- State of Florida, *Memorandum Opinion and Order*, 16 FCC Rcd 2174 (WTB 2001). Waives freeze on applications for 800 MHz General Category frequencies to permit Florida to obtain licenses on 19 "off-set" channels associated with twenty contiguous 800 MHz General Category channels previously licensed to Florida.
- Du Page Public Safety Communications, *Memorandum Opinion and Order*, 16 FCC Rcd 12394 (WTB PSPWD 2001). Grants waiver pursuant to Section 337(c) of the Act to permit public safety use of paging control channels.

- Federal Government Spectrum Available for Public Safety Interoperability Communications, *Public Notice*, 16 FCC Rcd 13662 (WTB PSPWD 2001). Reminds public safety community that the NTIA has specified 40 Federal Government frequencies that can be used by non-Federal government public safety entities for communications involving coordination and cooperation with Federal Government agencies.

Also, in late 2001, the Commission received white papers from Motorola and Nextel concerning public safety communications in the 4.9 GHz band and 800 MHz band, respectively. The Commission is considering those white papers in the appropriate proceedings.

## **2000**

- 1998 Biennial Regulatory Review -- 47 C.F.R. Part 90 - Private Land Mobile Radio Services; Replacement of Part 90 by Part 88 to Revise the Private Land Mobile Radio Services and Modify the Policies Governing Them and Examination of Exclusivity and Frequency Assignment Policies of the Private Land Mobile Services, WT Docket No. 98-182, PR Docket No. 92-235, *Report & Order and Further Notice of Proposed Rulemaking*, 15 FCC Rcd 16673 (2000). The R&O adopted rules intended to further consolidate and streamline Part 90 rules. In this connection the Commission amended its rules to allow, on a cost-shared, non-profit basis, (1) Public Safety licensees to share their land mobile radio facilities with Federal government entities and (2) Industrial/Business licensees to share their land mobile radio facilities with Public Safety and Federal Government entities. The NPRM proposed to extend the eligibility for licensing in the Public Safety Pool to school and park districts and authorities, and to extend eligibility for licensing on certain channels to include State highway maintenance radio systems.
- The Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communications Requirements Through the Year 2010, WT Docket No. 96-86, *Second Report and Order*, 15 FCC Rcd 16720 (2000). The 2<sup>nd</sup> R&O permitted, but did not require, commercial mobile radio service providers to offer Priority Access (“PAS”) to public safety providers. PAS offerings allow national security and emergency preparedness (“NSEP”) personnel and permitted authorized NSEP users in emergencies to gain access to the next available wireless channel but preemption of calls-in-progress is not required. The 2<sup>nd</sup> R&O required that carriers offering PAS must adhere to uniform operating protocols regarding the number of priority levels and the priority level for particular NSEP users, adopted 5 priority levels, limited access to key personnel, established the National Communications System as the day-to-day administrator of PAS, established oversight responsibilities with the FCC, and indicated that providing PAS in accordance with FCC rules will be prima facie lawful under federal law.
- The Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communications Requirements Through the Year 2010, WT Docket No. 96-86, *Second Memorandum Opinion and Order*, 15 FCC Rcd 16844 (2000). The 2<sup>nd</sup> MO&O addressed portions of the reconsideration petition filed in response to the 1<sup>st</sup> R&O (1998). The 2<sup>nd</sup> MO&O addressed technical issues concerning Public Safety 700 MHz band radios. The 2<sup>nd</sup> MO&O affirmed/clarified eligibility criteria for licensing in the 700 MHz band (including regional planning, frequency coordination), and the validity of Federal use of the band pursuant to 47 C.F.R. § 2.103(b) agreements with state/local governments.

- The Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communications Requirements Through the Year 2010, WT Docket No. 96-86, *Fourth Notice of Proposed Rulemaking*, 15 FCC Rcd 16899 (2000). The 4<sup>th</sup> NPRM sought comment on issues raised by the recommendations of the Public Safety National Coordination Committee (NCC) relative to technical and operational issues regarding the use of interoperability frequencies in the 700 MHz Public Safety band. For example, the 4<sup>th</sup> NPRM tentatively concluded that the NCC's recommended Project 25 Phase I standard should be the standard for the interoperability channels. The 4<sup>th</sup> NPRM also sought comment on interoperability issues concerning permissive trunking, channel aggregation, administration of interoperability plan, regional planning committee technical review, blanket licensing of mobile portables, use of memorandums of understanding, channel designations and labeling, channel efficiency requirements, and equipment requirements (interoperability capability, encryption, receiver standards).
- The Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communications Requirements Through the Year 2010, WT Docket No. 96-86, *Third Memorandum Opinion & Order and Third Report & Order*, 15 FCC Rcd 19844 (2000). The 3<sup>rd</sup> MO&O resolved reconsideration petitions related to the 1<sup>st</sup> R&O (1998) concerning 700 MHz Public Safety band frequencies. The 3<sup>rd</sup> R&O, which addressed comments to the 3<sup>rd</sup> NPRM (D96-86, 1998), created a new state license to streamline administrative procedures and to enhance spectrum efficiency. Under this decision, each state/district/territory has the option to receive a single, geographic license for up to 2.4 MHz of spectrum to use for public safety services. The 3<sup>rd</sup> R&O also adopted technical solutions to protect certain global navigation satellite systems and designated channels in existing public safety bands for mutual aid purposes.
- Amendment of the Commission's Rules Regarding Multiple Address Systems, WT Docket No. 97-81, *Report and Order*, 15 FCC Rcd 11956 (2000). Designated five - (12.5 kHz) - channel pairs in the 932/941 MHz bands for public safety use.
- Reorganization and Revision of Parts 1, 2, 21, and 94 of the Rules to Establish a New Part 101 Governing Terrestrial Microwave Fixed Radio Services, et al., WT Docket No. 94-148, *Memorandum Opinion and Order and Notice of Proposed Rulemaking*, 15 FCC Rcd 3129 (2000). NPRM seeks comment on the interplay between Part 101 and the Balanced Budget Act of 1997's definition of public safety radio services, including whether Part 101 spectrum should be designated for public safety radio services, and, if so, how much spectrum should be set aside.
- City of Denton, Texas, *Order*, 15 FCC Rcd 23643 (WTB 2000). Waived freeze on filing of applications to permit relocation of 800 MHz General Category station licensed to public safety entity.
- State of Wisconsin, *Order*, 15 FCC Rcd 4312 (WTB PSPWD 2000). Granted the State of Wisconsin a waiver to permit licensing of a four-site VHF trunked public safety communications system using federal/military frequencies between Federal, State, and local agencies on a routine basis. Granting this system represented a unique partnership between the Federal and State government and was the first multi-agency, multi-jurisdiction public safety VHF trunking system in the United States.

- In addition, the Wireless Telecommunications Bureau and the Public Safety and Private Wireless Division granted 4 waiver requests filed by public safety entities pursuant to Section 337(c) of the Act.

## **ATTACHMENT D**

### **Analysis of Non-Federal Government Frequencies That Are or Could Be Made Available for Use By Public Safety Systems**

Lower Freq. (MHz)	Upper Freq. (MHz)	Region 2	FCC Use	Rule Part	Viable Alternative to 138-144 MHz?
88	108	BROADCASTING	BROADCASTING (FM Channels 201-300)	Broadcast Radio (FM) (73) Auxiliary Broadcasting (74)	Not Viable
108	117.975	AERONAUTICAL RADIONAVIGATION	AERONAUTICAL RADIONAVIGATION	Aviation (87)	Not Viable
117.975	137	AERONAUTICAL MOBILE	AERONAUTICAL MOBILE	Aviation (87)	Not Viable
137	137.025	SPACE OPERATION (space-to-Earth) METEOROLOGICAL- SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) SPACE RESEARCH (space-to-Earth) Fixed Mobile except aeronautical mobile	SPACE OPERATION (space-to-Earth) METEOROLOGICAL- SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) SPACE RESEARCH (space-to-Earth)	Satellite Communications (25)	Not Viable
137.025	137.175	SPACE OPERATION (space-to-Earth) METEOROLOGICAL- SATELLITE (space-to-Earth) SPACE RESEARCH (space-to-Earth) Fixed Mobile-satellite (space-to-Earth) Mobile except aeronautical mobile	SPACE OPERATION (space-to-Earth) METEOROLOGICAL- SATELLITE (space-to-Earth) SPACE RESEARCH (space-to-Earth) Mobile-satellite (space-to-Earth)	Satellite Communications (25)	Not Viable

Lower Freq. (MHz)	Upper Freq. (MHz)	Region 2	FCC Use	Rule Part	Viable Alternative to 138-144 MHz?
137.175	137.825	SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) SPACE RESEARCH (space-to-Earth) Fixed Mobile except aeronautical mobile	SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) SPACE RESEARCH (space-to-Earth)	Satellite Communications (25)	Not Viable
137.825	138	SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) SPACE RESEARCH (space-to-Earth) Fixed Mobile-satellite (space-to-Earth) Mobile except aeronautical mobile	SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) SPACE RESEARCH (space-to-Earth) Mobile-satellite (space-to-Earth)	Satellite Communications (25)	Not Viable
144	146	AMATEUR AMATEUR-SATELLITE	AMATEUR AMATEUR-SATELLITE	Amateur (97)	Not Viable
146	148	AMATEUR	AMATEUR	Amateur (97)	Not Viable
148	149.9	FIXED MOBILE except aeronautical mobile MOBILE-SATELLITE (Earth-to-space)	MOBILE-SATELLITE (Earth-to-space)	Satellite Communications (25)	Not Viable
149.9	150.05	MOBILE-SATELLITE (Earth-to-space) RADIONAVIGATION-SATELLITE	MOBILE-SATELLITE (Earth-to-space) RADIONAVIGATION-SATELLITE	Satellite Communications (25)	Not Viable
150.05	152.855	FIXED MOBILE	FIXED LAND MOBILE	Public Mobile (22) Private Land Mobile (90)	Not Viable
152.855	154	FIXED MOBILE	LAND MOBILE	Auxiliary Broadcasting (74) Private Land Mobile (90)	Not Viable
154	156.2475	FIXED MOBILE	FIXED LAND MOBILE	Maritime (80) Private Land Mobile (90)	Not Viable
157.0375	157.1875	FIXED MOBILE		Private Land Mobile (90)	Not Viable

Lower Freq. (MHz)	Upper Freq. (MHz)	Region 2	FCC Use	Rule Part	Viable Alternative to 138-144 MHz?
157.1875	157.45	FIXED MOBILE	LAND MOBILE MARITIME MOBILE	Maritime (80) Private Land Mobile (90)	Not Viable
157.45	161.575	FIXED MOBILE	FIXED LAND MOBILE	Public Mobile (22) Maritime (80) Private Land Mobile (90)	Not Viable
161.575	161.625	FIXED MOBILE	MARITIME MOBILE	Public Mobile (22) Maritime (80)	Not viable
161.625	161.775	FIXED MOBILE	LAND MOBILE	Public Mobile (22) Auxiliary Broadcasting (74)	Not Viable
161.775	162.0125	FIXED MOBILE	LAND MOBILE MARITIME MOBILE	Public Mobile (22) Maritime (80) Private Land Mobile (90)	Not Viable
162.0125	173.2	FIXED MOBILE	*	Auxiliary Broadcasting (74) Private Land Mobile (90)	Not Viable
173.2	173.4	FIXED MOBILE	FIXED Land mobile	Private Land Mobile (90)	Not Viable
174	216	BROADCASTING Fixed Mobile	BROADCASTING (TV Channels 7-13)	Broadcast Radio (TV) (73) Auxiliary Broadcasting (74)	Not Viable
216	220	FIXED MARITIME MOBILE Radiolocation	MARITIME MOBILE Fixed Aeronautical mobile Land mobile	Maritime (80) Private Land Mobile (90) Personal Radio (95) Amateur (97)	Not Viable
220	222	AMATEUR FIXED MOBILE Radiolocation	FIXED LAND MOBILE	Private Land Mobile (90)	Not Viable
222	225	AMATEUR FIXED MOBILE Radiolocation	AMATEUR	Amateur (97)	Not Viable

\* The 162.0125-173.2 MHz band is allocated and used on a primary basis by Federal Government FIXED and MOBILE services, however, footnotes to the Table of Frequency Allocations (International footnote S.5225 and United States footnotes 8, 11, 13, 216, 223, 300 and 312, make certain frequencies in this band available for non-Federal use under certain conditions within specific geographic areas.