Exhibit 22

FCC STAFF REPORT ON NTIA'S STUDY OF CURRENT AND FUTURE SPECTRUM USE BY THE ENERGY, WATER AND RAILROAD INDUSTRIES

Submitted Pursuant to
Public Law No. 106-553

FEDERAL COMMUNICATIONS COMMISSION

July 30, 2002

This was at a time when the standard for modestly spectrum efficiient, and otherwise safe and reliable, wireless systems was trunked, digital 2G+. This shows that CII and railroad entities were not using such tech and system, and not efficiently using the large amounts of free spectrum they already were provided, and that they should stop pleading for even more free spectrum. They are among the nations largest industry segment and entities, and are fully capable of buying spectrum at FCC auctions, or in the secondary market. Auctions, including for 220 MHz, had been going on at this time, and have continued to this day, inclulding for VHF spectrum (30-300 MHz).

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FEDERAL COMMUNICATIONS COMMISSION
Staff Report

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TABLE OF CONTENTS

Heading	Page Number
INTRODUCTION	1
I. BACKGROUND	2
A. Procedural History	2
B. NTIA Report	2
C. Overview of Designated Industries' Systems	3
D. Bands Used by Energy, Water and Railroad Systems	6
II. FCC EFFORTS TO ADDRESS MATTERS IN THE NTIA REPORT	7
A. Access to Additional Spectrum	8
1. 27 MHz Reallocation of Government Spectrum	9
2. 700 MHz Band	9
3. PLMR Audit Below 512 MHz	10
4. 4.9 GHz Band	11
B. Reduced Congestion and Interference Avoidance	13
1. Rulemaking Proceedings Examining Interference	13
a. 900 MHz MAS	13
b. 800 MHz Public Safety Interference	14
2. Promoting Efficiencies in Use of Spectrum	16
a. Refarming	16
b. Band Managers	17
3. Flexibility in Rules	19
a. 900 MHz Ribbon License	19
b. Special Temporary Authority	21
C. Keeping Pace with the Future	21
1. Access to Satellite Services	22
2. 70/80/90 GHz Bands	22
3. Commercial Alternatives – 800 MHz	24
III. CONCLUSION	25

APPENDIX A: Potentially Available Spectrum for the Energy Water and Railroad Industries

APPENDIX B: Parties That Filed with the Commission Either Comments, Reply Comments or Ex Parte Correspondence Regarding the NTIA Report

FCC STAFF REPORT ON NTIA'S STUDY OF CURRENT AND FUTURE SPECTRUM USE BY THE ENERGY, WATER AND RAILROAD INDUSTRIES

Congress has directed the National Telecommunications and Information Administration (NTIA) Administrator, "after consultation with other federal agencies responsible for regulating the core operations of entities engaged in the provision of energy, water and railroad services," to "complete and submit to Congress . . . a study of the current and future use of spectrum by these entities to protect and maintain the nation's critical infrastructure."[1] In the statute, Congress also directed the "Chairman of the Federal Communications Commission [to] submit a report to Congress on actions that could be taken by the Commission to address any needs identified in the Administrator's study."[2] On January 30, 2002, NTIA submitted its report to Congress (*NTIA Report*).[3]

This Report addresses matters identified in the *NTIA Report*[4] and it reflects the Federal Communications Commission's efforts to meet the communications needs of the energy, water and railroad industries. Energy, water and railroad interests are critical to the nation's infrastructure and rely on radio spectrum to perform core operations, ranging from routine monitoring to emergency responses.[5] The Commission is especially sensitive to needs involving domestic security concerns.[6] Therefore, the spectrum needs of the designated industries as well as others must be very carefully balanced and efficient use of the spectrum must be encouraged. Recent and ongoing actions of the Commission, as will be discussed, demonstrate how the Commission is responding to maximize the use of the airwaves.

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[1] *See* Federal Funding, Fiscal Year 2001, Pub. L. No. 106-553, 114 Stat. 2762, 2762A-73 (2000). *See* text accompanying note 10, *infra,* for federal agencies consulted by NTIA.

[2] *Id.*

[3] Marshall W. Ross and Jeng F. Mao, Current and Future Spectrum Use by the Energy, Water, and Railroad Industries, Response to Title II of the Departments of Commerce, Justice, and State, Judiciary, and Related Agencies Appropriations Act, 2001 Public Law 106-553, U.S. Dept. of Commerce, NTIA (Jan. 2002).

[4] As Public Law 106-553 is explicit with respect to the spectrum needs of particular types of entities that are to be studied and reported upon (*i.e.*, energy, water and railroad industries), this Report will not address potential spectrum needs of entities in other industries. In response to the Commission's request for comment on the *NTIA Report,* several commenters have suggested that the Commission should examine the spectrum needs of other industries as well. *See* ITA Reply Comments to Wireless Telecommunications Bureau Seeks Comment on NTIA Report on Current and Future Spectrum Use by the Energy, Water, and Railroad Industries, 17 FCC Rcd 2458 (2002) (*WTB PN*) at 4; ARINC Comments to *WTB PN* at 1. As the scope of this Report is established by statute, these additional matters are not addressed herein.

[5] *See* Sec. I.C., *infra.*

[6] *See e.g.,* The 4.9 GHz Band Transferred from Government Use, WT Docket No. 00-32, *Second Report and Order and Further Notice of Proposed Rulemaking,* 17 FCC Rcd 3955 (2002) (*4.9 GHz Proceeding)*.

The Report is divided into three sections. Section I provides the background on the *NTIA Report* and this Report, presents the major concerns identified in the *NTIA Report*, and offers an overview of the communications systems used by the energy, water and railroad industries ("designated industries") and the bands currently used by these industries. Section II addresses major actions that the Commission has taken to address the spectrum requirements of the designated industries. Section III provides the FCC Staff's response to the matters identified by NTIA.

I. BACKGROUND

A. Procedural History

In preparation for the *NTIA Report*, on April 9, 2001, NTIA solicited comments from industry and the public.[7] The agency sought information on any issues of fact, law or policy that would inform the agency about spectrum requirements of the designated industries, taking into account growth, new technology, and future applications.[8] In response, nineteen parties filed comments, of which five comments were from industry trade organizations.[9] On July 5, 2001, NTIA also sent letters to federal agencies with regulatory oversight over the designated industries, seeking information related to their oversight of these industries and spectrum requirements. NTIA received replies from the Department of Energy, the Federal Energy Regulatory Commission, and the Environmental Protection Agency.[10] Additionally, NTIA solicited relevant information from the Interdepartment Radio Advisory Committee and Public Safety Wireless Network.[11]

After the *NTIA Report* was submitted to Congress, the Commission's Wireless Telecommunications Bureau requested public comment on the report.[12] Various associations, utility companies, water authorities and the U.S. Department of Transportation (DOT) provided comments. The vast majority of those filing comments with the Commission support the *NTIA Report's* assertions.[13]

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[7] NTIA's Request for Comment on Energy, Water and Railroad Service Providers' Spectrum Use Study, 66 Fed. Reg. 18448 (2001). Comments were due June 8, 2001. *Id*.

[8] *See NTIA Report,* Sec. 1, at 1-4.

[9] The five trade organizations are: American Petroleum Institute (API), American Water Works Association (AWWA), Association of American Railroads (AAR), National Telecommunications Cooperative (NTC), and the United Telecom Council (UTC).

[10] *See NTIA Report*, Sec. 1, at 1-3.

[11] *Id.* at Sec. 1, at 1-2.

[12] *WTB PN,* 17 FCC Rcd 2458. Comments were due March 6, 2002 and reply comments were due March 18, 2002. *Id*. The Commission received 18 comments, 15 reply comments and 3 *ex parte* correspondence in this matter.

[13] Hereafter, this Report will refer to entities that filed some form of comments with the Commission on the *NTIA Report* as "commenters", and will refer to comments and reply comments filed in this proceeding as, respectively, "Comments to *WTB PN*" and "Reply Comments to *WTB PN*." A list of commenters is attached at Appendix B.

B. NTIA Report

The *NTIA Report* acknowledged the vital roles that the railroad, water and energy industries play in the Nation's critical infrastructure[14] and that the events of September 11th underscored the importance of these industries not only in the daily lives of the public, but also in times of disaster response and recovery.[15] Based "predominantly on comments received . . . and information from federal agencies with oversight or regulatory authority over these industries,"[16] the report made a number of statements based on the record, which fall into three main categories of concern. Those categories are: (1) access to additional spectrum,[17] (2) spectrum congestion and interference,[18] and (3) the limitations of commercial technological applications.[19]

The *NTIA Report* also notes a number of other concerns with regard to the comments that it received, such as a lack of consensus with respect to where spectrum can be reallocated or obtained.[20] Further, the *NTIA Report* notes that NTIA received a limited response on the issue of whether the energy, water and railroad industries use spectrum-efficient technology.[21] Moreover, the *NTIA Report* points out that generally, the comments to NTIA were not specific with respect to the frequency bands that the designated industries use.[22] Accordingly, the *NTIA Report* states that the agency is "unable to validate specific [radio spectrum] requirements" of the energy, water and railroad industries" and "issues highlighted . . . [in the *NTIA Report*], such as exclusivity and congestion."[23]

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[14] *NTIA Report,* Sec. 7, 7-1.

[15] *Id.*

[16] *Id.* at xxi.

[17] The *NTIA Report* indicates that commenters generally believe that: continued access to spectrum is crucial to the current and future operations of the designated industries (*Id.* at xvii); and without adequate spectrum, these industries would be unable to address major service interruptions due to disasters or equipment malfunctions. *Id.* Sec. 3, at 3-3.

[18] The *NTIA Report* shows that commenters generally believe that: spectrum congestion is leading to interference in some spectrum bands (*Id.* at xviii; Sec. 7, at 7-2, 7-3); additional spectrum is needed to alleviate congestion and lack of available spectrum to these industries (*Id.*); and exclusive spectrum (*i.e.,* spectrum allocated for specific services) would help to avoid interference problems (*Id.* at Sec. 7, at 7-2*)*.

[19] The *NTIA Report* conveys that commenters generally believe that commercial wireless technologies, by themselves, are inadequate to meet their needs due to insufficient coverage, reliability, redundancy, robustness, and high cost. *Id.* at xviii; Sec. 7, at 7-2.

[20] *Id.* at xviii.

[21] *Id.*

[22] *Id.* However, the *NTIA Report* shows that the energy, water and railroad industries generally use spectrum between 20 MHz and 25 GHz. *See NTIA Report* at Sec. 2, at 2-1through 2-7. The *NTIA Report* indicates that these industries generally operate in the 150-174 MHz Private Land Mobile Radio (PLMR) service (VHF), 450-512 MHz PLMR service (UHF), 806-821/851-866 MHz PLMR service, 896-901/935-940 MHz PLMR service, 902-928 MHz, 2.4 and 5.8 GHz unlicensed bands, 928/932/941/952/956/959 MHz Multiple Address Service (MAS), and on microwave links from 2 GHz to 19 GHz.

[23] *Id.* at xxi. The agency "did not independently validate . . . spectrum requirements". *NTIA Report* at Sec.1. at 1-3.

C. Overview of Designated Industries' Systems

According to the record gathered by NTIA, providers of energy, water and railroad services rely on wireless radio systems as both an effective and efficient way to process critical voice and data information that allows for the day-to-day control of their systems.[24] They rely on wireless technologies for routinely assessing their systems, as well as to perform maintenance and repair functions.[25] In addition, some utilities use wireless technology to facilitate compliance with timely system restoration or emergency notification requirements that may be imposed by various state laws.[26]

In the energy industry, companies may use wireless technology while prospecting for petroleum and in the distribution by pipeline of fuels.[27] Wireless technology is also used in maintaining the security of nuclear power plants.[28] Moreover, the producers, suppliers and distributors of electric energy use wireless systems to monitor and inspect power transmission lines, reroute or "switch" electricity safely, and coordinate the activities of work crews.[29] For example, when companies are pulling electrical lines, workers are often separated because the ends of the electrical line are far apart.[30] Wireless technology plays an important role in helping workers coordinate their efforts to pull the lines safely and properly.[31]

Water utilities also rely on wireless technologies for a variety of purposes in their systems of pipelines, mains, reservoirs and aqueducts.[32] Use of wireless technologies can enable these utilities to immediately report the status of leaks, malfunctions or problems found during inspections by field personnel.[33] Moreover, wireless technology plays a critical function while shutting down portions of plant facilities, where any error in communications could result in the loss of vast quantities of water or the loss of lives of personnel performing the shut down.[34]

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[24] *See generally NTIA Report* Secs. 1-3. *See also* Michele Farquhar, *et al*, *Private Land Mobile Radio Services: Background*. Wireless Telecom. Bureau Staff Paper, FCC, 1996 (*WTB PLMR Paper*) at 7-103. *See generally* AAR Comments to *WTB PN*; *see also generally* UTC Comments to *WTB PN*.

[25] *See generally WTB PLMR Paper.*

[26] *See, e.g.,* Southern Comments to *WTB PN* at 10-13 (on requirements of Alabama, Florida, Georgia and Mississippi).

[27] *See* 47 C.F.R. § 90.35(c)(1)(A)-(B).

[28] *See* Amendment of Part 15, Subpart F, to Permit Operation of Field Disturbance Sensors in the Band 54 to 72, and 76 to 88 MHz, Gen. Docket No. 85-231, RM-4824, *Notice of Proposed Rule Making*, 101 F.C.C.2d 962 ¶ 2 (1985).

[29] ConEd Comments to *WTB PN* at 9-11.

[30] *Id.* at 10.

[31] *Id.*

[32] MWD Comments to *WTB PN* at 2; WPJWA Comments to *WTB PN* at 2.

[33] MWD Comments to *WTB PN* at 2; WPJWA Comments to *WTB PN* at 2.

[34] WPJWA Comments to *WTB PN* at 2-3.

The railroad industry uses wireless technologies to: monitor and control train functions; provide communications between train and dispatch centers; maintain tracks, roadbeds and rights-of-way; in switching (*i.e.*, moving train cars from one set of tracks to another); and set track switches.[35] Moreover, wireless technologies also will be important in implementing the advanced civil speed enforcement system or Positive Train Control systems.[36] These data communications and computer-based technologies are designed to assist railroad personnel in controlling train movement, train separation, and route alignment. Railroad industry activity has focused on employing Positive Train Control systems to protect against train collisions and incursions into locations reserved for roadway workers, and enforcing train speed restrictions.[37]

Commenters generally agree with the *NTIA Report* that the designated industries rely on wireless communication networks to process voice and data information and to comply with current safety, operational, and other regulatory requirements.[38] They generally indicate that wireless services offer a reliable means of maintaining command, coordination, and control during ordinary daily and emergency situations.[39] Commenters explain that wireline services are not an adequate alternative to wireless services because the former are not mobile, can be disabled when they are needed the most, and are generally not as cost-effective to them.[40] Therefore, the providers of energy, water, and railroad services are generally supportive of NTIA's concern that, without adequate spectrum, they would be unable to address major service interruptions due to natural disasters or equipment malfunctions.[41]

The designated industries are looking to wireless systems as providing an effective and efficient means of communication during emergencies,[42] such as in situations where there are service interruptions due to natural disaster, equipment malfunctions or terrorist activities.[43]

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[35] AAR Comments to *WTB PN,* Attachment at 6-8.

[36] *See* AAR Comments to *WTB PN*, Attachment Exhibit D at 1-7, 9-10.

[37] *Id.,* Attachment Exhibit D at 3.

[38] *See, e.g.,* Cinergy Comments to *WTB PN* at 6-12; ConEd Comments to *WTB PN* at 6-12; API Comments to *WTB PN* at 4-6; MWD Comments to *WTB PN* at 2-3; WPJWA Comments to *WTB PN* at 2-4.

[39] *See* DPLC&ACE Comments to *WTB PN* at 6-11; UTC Comments to *WTB PN* at 7-10; Entergy Comments to *WTB PN* at 7-11; SCANA Comments to *WTB PN* at 7-12.

[40] *See, e.g.* Cinergy Comments to *WTB PN* at 29-31; Entergy Comments to *WTB PN* at 29-31; DPLC&ACE Comments to *WTB PN* at 28-30; SCANA Comments to *WTB PN* at 29-31. For the railroad industry, wireline communication is not a viable option due to the inherent mobile nature of the industry. *See* AAR Comments to *WTB PN*, Attachment at 23.

[41] *See generally* SCANA Comments to *WTB PN* at 11-14; DPLC&ACE Comments to *WTB PN* at 4-16; Entergy Comments to *WTB PN* at 5-15; ConEd Comments to *WTB PN* at 6-16; Cinergy Comments to *WTB PN* at 6-12; Southern Comments to *WTB PN* at 9-17.

[42] *WTB PLMR Paper* at 3.

[43] This shift in thinking has become evident in light of the terrorist attacks of Sept. 11, 2001. A number of companies indicate an even greater need for wireless communications in view of the general disruption of local telephone facilities that occurred in Manhattan and the inability of landlines to communicate to and from Consolidated Edison's utility mobile command centers. *See* ConEd Comments to *WTB PN* at 12-13; Cinergy Comments to *WTB PN* at 13; DPLC&ACE Comments to *WTB PN* at 12; SCANA Comments to *WTB PN* at 12-13. Anticipating scenarios involving terrorist attacks is particularly important in light of recent evidence found in

AAR points out that when natural or man-made disasters occur, the circuits of telephone companies may be busy or simply not work.[44] In such situations, the designated industries must rely on their own communications networks to perform work that can become extremely important to the larger community.[45] Any degradation or interruption in the wireless radio systems used by the industries during emergency periods could significantly hamper the efforts of emergency responders and law enforcement, whose success can depend upon the swift and timely receipt of critical information.[46] Moreover, the lack of adequate technology can certainly place at risk the success of responses involving multiple jurisdictions.[47]

D. Bands Used by Energy, Water and Railroad Systems

Currently, the designated industries use frequencies across a very wide range of bands, primarily between 20 MHz and 25 GHz.[48] Radio systems are most commonly found in the PLMR service bands (150-174 MHz, 450-512 MHz, 806-821/851-866 MHz, 896-901/935-940 MHz), Location and Monitoring Service band (902-928 MHz), the Fixed Microwave Service bands (2.4/5 GHz) and microwave links in many bands from 2 GHz to 19 GHz or higher, and MAS band (928/952/956 MHz, 928/959 MHz, and 932/941 MHz).[49] Additionally, in the 1.614 MHz and 2 MHz bands, usage may be authorized in connection with prospecting for petroleum, natural gas, or petroleum products; distribution of electric power; the distribution by pipeline of fuels or water; exploration and the repair of pipelines; and the repair of telecommunications circuits.[50]

Most commenters indicate that spectrum allocations beyond those for which current Commission regulations provide are needed to meet the communications needs of the designated industries.[51] However, only a few commenters specifically quantified their needs.[52] As was

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Afghanistan. There, the United States discovered that terrorists had diagrams of American public water facilities and nuclear power plants. ConEd Comments to *WTB PN* at 6, *citing* David Johnston and James Risen, *Seized Afghan Files Show Intent, Not Plans,* N.Y. Times, Feb. 1, 2002 at A13. The fact that a known terrorist group had this detailed information strongly suggests that utilities are viewed as an attractive target by terrorists. ConEd Comments to *WTB PN* at 6.

[44] AAR Comments to *WTB PN,* Attachment at 24.

[45] *Id.*

[46] *See 4.9 GHz Proceeding,* 17 FCC Rcd at 3966-70.

[47] *Id.*

[48] *NTIA Report* at xviii. The majority of the spectrum used by designated industry users is shared with other users and is allocated exclusively for non-Federal Government use. This spectrum includes the PLMR frequency bands, except 902-928 MHz, the 900 MHz MAS bands, and most of the fixed service bands (*i.e*, 2450-2483.5 MHz and 5925-6425 MHz). Some of the fixed service bands are shared with Federal Satellite service (*e.g.*, 17.8-18.3 GHz). *See* 47 C.F.R. § 2.106.

[49] *See* 47 C.F.R. Parts 90 and 101; *see also NTIA Report*, Table 6-1.

[50] *See* 47 C.F.R. § 90.35(c)(1)(i).

[51] *See e.g.,* Cinergy Comments to *WTB PN* at 13-16; ConEd Comments to *WTB PN* at 14-18; DPL&ACE *WTB PN* at 13-16; Entergy Comments to *WTB PN* at 2; Itron Comments to *WTB PN* at 1; SCANA Comments to *WTB PN* at 13-16; Southern Comments to *WTB PN* at 16-17; UTC Comments to *WTB PN* at

similarly reported in the *NTIA Report,* only a few commenters propose where available spectrum could be found.[53] Appendix A to this Report shows the Commission either provides for use or is currently examining for potential use by the designated industries virtually all of the bands identified in the *NTIA Report*.[54]

II. FCC EFFORTS TO ADDRESS MATTERS IN THE NTIA REPORT

In fulfilling the statutory obligation to "address any needs identified" by the *NTIA Report*, a difficulty arises for the Commission in that the *NTIA Report* does not independently validate or investigate any specific needs or requirements of the designated industries. The Report offers information provided by industry commenters as the basis for its review. Nonetheless, as specified previously, the *NTIA Report* reflects three major areas of concern.[55] The Commission is continually evaluating spectrum implications with regard to promoting safety of life and property that involve these issues.[56] Accordingly, the Commission has undertaken, as this Report will demonstrate, a number of proceedings that have a positive impact on the spectrum needs of the energy, water and railroad industries and address concerns raised by parties who commented on the *NTIA Report*. The discussion next turns to a detailed examination of the Commission's

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15-17; WPJWA Comments to *WTB PN* at 4-5; WGP Comments to *WTB PN* at 5; YW Comments to *WTB PN* at 3-5.

[52] UTC's estimate of the amount of spectrum needed by the designated industries tracks the 1998 recommendations of the Utilities Spectrum Assessment Taskforce (USAT). Utilities Spectrum Assessment Taskforce (USAT) Final Report, United Telecom Council, June 30, 1998. In its recommendations, the USAT projected that future wireless applications and growth would require 1.0 MHz of additional spectrum by the year 2000, 1.9 MHz of additional spectrum by the year 2004, and 6.3 MHz of additional spectrum by the year 2010. *Id.* at 1. AAR states that the railroad industry is experiencing congestion in the mobile radio frequency bands over which AAR exercises coordination control, particularly in major urban centers where rail lines converge and large terminal and yard operations are located. (The AAR exercises coordination control over three VHF bands, 160.215-161.565 MHz, the designated channel pairs between 450-460 MHz, and the six channel pairs at 896/923 MHz for Positive Train Control Systems). AAR Comments to *WTB PN,* Attachment at 25.

[53] AAR is looking to the 700 MHz Guard Band for available spectrum because it believes that the licensees may be in a position to enter into long-term contracts with railroads for the provision of wireless services. *Id*. UTC hopes to identify spectrum below 1 GHz to be allocated on an exclusive basis for the designated industries and the other "critical infrastructure" industries. UTC Comments to *WTB PN* at 5, 11. Some commenters would like more PLMR spectrum in the 48 MHz, 150 MHz, 450 MHz, 800 MHz, and 900 MHz bands because the majority of the current spectrum used by the designated industries is in these bands. *See* Cinergy Comments to *WTB PN* at 17; DPLC&ACE Comments to *WTB PN* at 16. Other commenters would like spectrum to be made available to the designated industries for telemetry, utility dispatch, and Supervisory Control and Data Acquisition (SCADA) operations. *See* Cinergy Comments to *WTB PN* at 17; DPLC&ACE Comments to *WTB PN* at 16; SCANA Comments to *WTB PN* at 17. SchlumbergerSema, Inc. (SchlumbergerSema), a provider of advanced meter reading services, would like to see private carriage permitted in the MAS bands. SchlumbergerSema Comments to *WTB PN* at 7.

[54] *See NTIA Report*, Sec. 6 at Table 6-2.

[55] *See* text accompanying notes 17-19, *supra.*

[56] *See* 47 U.S.C. § 151. Moreover, the Commission has recently established a Spectrum Policy Task Force, whose purpose is to conduct a systematic evaluation of existing spectrum policies and to make recommendations as to possible improvements. Spectrum Policy Task Force Seeks Public Comment on Issues Related to Commission's Spectrum Policies, *Public Notice*, DA 02-1311 (rel. June 6, 2002).

efforts to address the three major areas of concern reflected in the *NTIA Report* with respect to the designated industries, namely: access to spectrum, spectrum congestion and interference, and the limitation of commercial technological applications.

A. Access to Additional Spectrum

As previously noted, the designated industries use spectrum between 20 MHz and 25 GHz.[57] Even though spectrum is available in these bands for use by the designated industries, the *NTIA Report* indicates that commenters believe that access to additional spectrum is needed.[58] Accordingly, the *NTIA Report* summarizes the frequency bands that the designated industries believe they could use.[59] In light of the *NTIA Report's* identification of access to additional spectrum as a concern of the designated industries, this section of the report addresses the Commission's allocation and licensing of spectrum that could be used by the designated industries.[60] Specifically, since 1995, the Commission has evaluated over 56 megahertz of additional spectrum for potential use by the designated industries in some of the bands identified in the *NTIA Report*.[61] This spectrum covers a large swath between 20 MHz and 25 GHz.

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[57] As a whole, the energy industry uses frequencies anywhere from 25 MHz to 25 GHz. *See NTIA Report*, Sec. 3, at 3-17.

[58] *NTIA Report* at xx, 3-24, 4-8, 6-1.

[59] The *NTIA Report* indicates that the 220 MHz band, 450 MHz band, 800 MHz band, 900 MHz band, 1427–1432 MHz band and the 1–12 GHz band could be used by the Energy Industry. *NTIA Report*, Table 2, at xx. Moreover, the *NTIA Report* indicates that the 216–220 MHz band, 6 GHz band, 11 GHz band and 23 GHz band could be used by the water industry. *Id*. Finally, the *NTIA Report* indicated that the 700 MHz band and the 1.4 GHz band could be used by the railroad industry. *Id*.

[60] The designated industries failed to provide NTIA with sufficient information to determine how much spectrum is available or used in the frequency bands. *NTIA Report* at 3-18, 4-6, 5-7.

[61] *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, and Amendment of Parts 2 and 95 of the Commission's Rules to Create a Wireless Medical Telemetry Service; and Amendments to Part 90 of the Commission's Rules Concerning Private Land Mobile Radio Services, *Report and Order and Memorandum Opinion and Order,* 17 FCC Rcd 368 (2002) (*27 MHz Reallocation Report and Order*); *see also* Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission's Rules, WT Docket No. 99-168, *First Report and Order*, 15 FCC Rcd 476, 491 ¶ 34 (2000) (*700 MHz First Report and Order*); *see also* Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission's Rules WT Docket No. 99-168, *Second Report and Order, see also* 15 FCC Rcd 5299 (2000) (*700 MHz Second Report and Order*); *see also 4.9 GHz Proceeding,* 17 FCC Rcd 3955; *see also* Replacement of Part 90 by Part 88 to Revise the Private Land Mobile Radio Services and Modify the Policies Governing Them, PR Docket No. 92-235, *Second Report and Order,* 12 FCC Rcd 14307 (1997) (*Refarming Proceeding); see also* Amendment of the Commission's Rules Regarding Multiple Address Systems, WT Docket No. 97-81, *Report and Order,* 15 FCC Rcd 1956 (2000) (*900 MHz MAS Order); see also* Improving Public Safety Communications in the 800 MHz Band, Consolidating the 900 MHz Industrial/Land Transportation and Business Pool Channels, WT Docket No. 02-55, *Notice of Proposed Rule Making*, 17 FCC Rcd 4873 (2002) (*800 MHz NPRM*); Service Rules for Use of the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands; *see also* Loea Communications Corporation Petition for Rulemaking, WT Docket No. 02-146, RM-10288, *Notice of Proposed Rule Making*, FCC 02-180 ¶ 14 (rel. June 28, 2002) (*70/80/90 GHz Proceeding*).

1. 27 MHz Reallocation of Government Spectrum

As mentioned above, the *NTIA Report* indicates that commenters believe additional access to spectrum in the 216–220 MHz band and the 1427–1432 MHz band could be used by the designated industries.[62] In the *Government Transfer Bands R&O*, the Commission amended its rules to permit secondary telemetry operators the flexibility to utilize the 216–220 MHz band.[63] These changes were designed to enhance the use of the 217-220 MHz band for radio services provided by utilities and pipeline companies.[64]

In addition to the amendments affecting the 216–220 MHz band, the Commission also amended its rules with regards to the use of telemetry in the 1427–1432 MHz band.[65] Specifically, the Commission elevated telemetry to primary status in the 1429–1432 MHz band, and non-medical telemetry maintained secondary status in the 1427–1429.5 bands.[66] These decisions also help to relieve congestion and may lead to the development of new technologies and services.

2. 700 MHz Band

AAR, in comments to the *NTIA Report*, indicated that the railroad industry believes it could use spectrum in the 700 MHz Guard Band for future expansion.[67] Moreover, AAR indicated that this spectrum should be licensed by geographic area to guard band managers.[68]

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[62] *NTIA Report,* Sec. 3, 3-24 through 3-25.

[63] *See 27 MHz Reallocation Report and Order*, 17 FCC Rcd 368, 375-84 (2002). However, the Commission declined to grant new licenses in the 216–217 MHz band because this portion of the band was reallocated to Low Power Radio Service. *Id*.

[64] *Id*.

[65] Telemetry is relied upon by utilities for automated meter reading. *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 WT Docket No. 02-08; RM-9267; RM-9692; RM-9797; RM-9854; RM-9882, *Notice of Proposed Rule Making,* FCC 02-15, ¶ 25 (rel. Feb. 6, 2002).

[66] *See 27 MHz Reallocation Report and Order*, 17 FCC Rcd at 368.

[67] *See NTIA Report* at xxi, Sec. 5, at 5-10. The 700 MHz Guard Band is commercial spectrum immediately adjacent to the 747-762 MHz and 777-792 MHz public safety bands – *i.e.*, the 746-747 MHz, 776-777 MHz, and 792-794 MHz bands. These commercial bands were auctioned in two paired segments, one of 4 MHz and one of 2 MHz. The Guard Band was established to avoid interference problems for public safety in the 700 MHz Guard Band, and for other technical reasons. *See generally 700 MHz Second Report and Order*, 15 FCC Rcd 5299 (2000). The Guard Band has protections that include a requirement that entities operating in the 700 MHz Guard Band cannot employ cellular system architectures. *Id.* The Commission defines "cellular system architecture" as "one where large geographic service areas are segmented into many smaller areas or cells, each of which uses its own base station, to enable frequencies to be reused at relatively short distances. *Id.* at 5306 ¶ 14 n.34. Protections also include a requirement that entities operating in the Guard Band must comply with out-of-band emission limits (*Id.* at 5299 ¶ 2), and with prescribed frequency coordination procedures that, among other things, require advance notification to Commission-recognized public safety frequency coordinators and adjacent area Guard Band users. *Id.* The Commission's interference criteria ensures that public safety licensees in the 700 MHz band operate free of interference from any new commercial users in that band.

[68] *See NTIA Report* at xxi.

The 700 MHz Guard Band spectrum consists of six megahertz of spectrum in the 746-776 and 776-794 MHz bands.[69] As AAR suggested, the Commission adopted rules authorizing guard band managers for this spectrum.[70] A guard band manager has the ability to lease the rights to use its spectrum to third parties through private, contractual agreements without having to secure prior approval by the Commission.[71] Additionally, a band manager is responsible for performing a valuable frequency coordination function.[72] Thus, guard band managers may aptly be called "next generation" frequency coordinators. The Commission has assigned licenses to entities which specifically function as guard band managers, consistent with the technical rules adopted to protect public safety users in adjacent bands.[73] Generally, the 700 MHz Guard Band is available to the designated industries, to include the railroad industry, through the use of "guard band managers."

3. PLMR Audit Below 512 MHz

UTC seeks access to exclusive spectrum in the 450 MHz band[74] because the energy industry uses spectrum in this band.[75] The *NTIA Report* states that energy providers seek exclusive spectrum because they share spectrum with a broad range of users in the Industrial/Business Pool of frequencies.[76] Consequently, some energy providers experience ambient noise in this frequency band, as well as harmful interference.[77] To reduce the possibility of the ambient noise and harmful interference, these energy providers seek exclusive spectrum in this frequency band.

Although spectrum is available in this band, the spectrum is licensed on a shared basis.[78] Thus, energy providers cannot receive exclusive spectrum in this band. However, access to additional spectrum in this band is possible. Currently, the Commission's Wireless Telecommunications Bureau is conducting an audit of PLMR spectrum below 512 MHz to ensure efficient spectrum use.[79] This audit will determine the construction and operational status of

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[69] *See* note 67, *supra.*

[70] *See 700 MHz First Report and Order*, 15 FCC Rcd 476 (2000); *700 MHz Second Report and Order,* 15 FCC Rcd 5299.

[71] *700 MHz Second Report and Order,* 15 FCC Rcd at 5322 ¶ 49.

[72] *Id.* at 5299 ¶ 2.

[73] *See* Sec. II.B.2.b, *infra,* for general discussion on band managers.

[74] *See NTIA Report* at xx.

[75] *Id*. Sec. 3, at 3-24.

[76] *See NTIA Report* at 3-18.

[77] *Id*. at 3-20.

[78] *See generally* 47 C.F.R. Part 90.

[79] *See generally* Wireless Telecommunications Bureau Announcement of an Audit of the Construction and Operational Status of Private Land Mobile Radio Stations, *Public Notice*, 16 FCC Rcd 14264 (WTB 2001). In recent months, the Bureau has been sending letters to these station licensees and may conduct random

PLMR stations licensed below 512 MHz that are subject to frequency coordination.[80] Licensees who are not using the spectrum as authorized are subject to cancellation of their licenses.[81] To the extent this happens, spectrum from the canceled licenses can be made available to other entities for licensing. Since the start of the audit, over 27,000 PLMR licenses below 512 MHz have been returned or canceled as a result of this audit. Thus, the audit has significantly increased the potential availability of spectrum below 512 MHz for entities in the designated industries.[82]

4. 4.9 GHz Band

The energy industry uses frequencies between 25 MHz and 25 GHz.[83] Within this range, energy companies use point-to-point microwave systems, shared industrial/business pool, and systems in VHF and UHF.[84] However, the *NTIA Report* indicates that the Energy industry seeks additional spectrum in the bands between 1–12 GHz for fixed narrow and medium-wide data channels.[85] This quest for additional spectrum could potentially be satisfied through the Commission's recent allocation in the 4920-4990 MHz band (4.9 GHz band).

In the *4.9 GHz Proceeding*,[86] the Commission allocated 50 megahertz of spectrum in the 4.9 GHz band for fixed and mobile services, in support of public safety.[87] The Commission also sought comment on eligibility for the spectrum, which could provide for use of this spectrum by the designated industries.[88] The availability of this spectrum provides an opportunity for responders to carry out critical and urgent missions in a way that ensures more effective and efficient services to the nation's location communities while providing a safer environment for

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station inspections to insure the completeness and accuracy of the required responses. To date, the Bureau has mailed over 300,000 audit letters to licensees.

[80] The Commission's Part 90 rules for PLMR stations require and that stations must be placed in operation within twelve months from the date of authorization, and that stations remain operational, in order for the license to remain valid. 47 C.F.R. §§ 90.155(a), 90.157.

[81] When a licensee fails to construct its authorized PLMR facilities within its construction period, or allows its constructed station(s) to discontinue operations for a period of one year, the station license cancels automatically. *See* 47 C.F.R. §§ 90.155(a), 90.157. If a station is not placed in operation within the required time, the Commission's rules require the licensee to return the authorization to the Commission. *See* 47 C.F.R.
§ 90.155(a).

[82] Derived from information reported by the Licensing & Technical Analysis Branch of the Commission's Public Safety and Private Wireless Division.

[83] *See NTIA Report* Sec. 3, at 3-17.

[84] *See id.*

[85] *See NTIA Report* at xx.

[86] *4.9 GHz Proceeding,* 17 FCC Rcd 3955.

[87] *Id.* at 3955 ¶ 1. (With the exception of aeronautical mobile service.)

[88] *Id.* at 3970-73 ¶¶ 31-38. Comments were due July 8, 2002; reply comments are due Aug. 7, 2002.

emergency responders.[89] For example, the use of video for remote-controlled robotics in dangerous terrorist situations or the "real time" monitoring of suspects in high-risk situations.[90]

Notably, this allocation may result in potentially additional spectrum for the designated industries if the Commission expands what constitutes "public safety" services, as it is currently considering.[91] Unlike the public safety allocation in the 700 MHz band, which is limited by the statutory definition of "public safety services,"[92] the 4.9 GHz band is not subject to any statutory restriction on eligibility to operate in the band. Therefore, the Commission is appropriately considering a broad definition of "public safety services" to include what it has described as "partnership opportunities between the more traditional public safety entities (*i.e.,* entities offering police, fire and ambulance services), and critical infrastructure entities, such as utility companies, railroads, and others."[93] In comments filed in the *4.9 GHz Proceeding*, designated industry users express support for such a broad definition of "public safety services"[94] and express their interest in being able to use spectrum in the 4.9 GHz band.[95] The Commission intends to fully explore innovative and non-traditional means of employing public safety use of the band.[96] In short, while eligibility to use the band has not yet been determined,[97] the designated industries are potential users of this spectrum allocation.

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[89] *Id.* at 3966-67 ¶ 23.

[90] *Id.* at 3962 ¶ 9.

[91] *Id.* at 3970-73 ¶¶ 31-38.

[92] Section 337(f) of the Communications Act of 1934, as amended, 47 U.S.C. 337(f), defines "public safety services" as services: "(A) the sole or principal purpose of which is to protect the safety of life, health, or property; (B) that are provided (i) by State or local government entities; or (ii) by nongovernmental organizations that are authorized by a government entity whose primary mission is the provision of such services; and (C) that are not made commercially available to the public by the provider."

[93] *4.9 GHz Proceeding,* 17 FCC Rcd at 3971 ¶ 34.

[94] *See* AAR Comments in *4.9 GHz Proceeding* (filed July 8, 2002) at 3-4; Joint Comments of Cinergy and Consumers Energy in *4.9 GHz Proceeding* (filed July 8, 2002) at 17-24; UTC Comments in *4.9 GHz Proceeding* (filed July 8, 2002) at 2-4.

[95] Cinergy and Consumers Energy state that the critical infrastructure industries, in which they include themselves, "would use the 4.9 GHz band for essentially the same applications identified by Public Safety entities . . . ." Joint Comments of Cinergy and Consumer Energy in *4.9 GHz Proceeding* (filed July 8, 2002) at iii. Further, they state that "[t]he 4.9 GHz could enhance the ability of Cinergy and Consumers to perform their public safety services in a more efficient and effective manner." *Id.* at 4. UTC states that "[u]tilities and other CI [critical infrastructure] entities are first responders with traditional public safety agencies, and the 4.9 GHz band could be used for such 'hot spot' communications. Moreover, making all likely emergency responders eligible for licensing in the 4.9 GHz band would encourage the joint development of these systems. . . ." UTC Comments in *4.9 GHz Proceeding* (filed July 8, 2002) at 3. AAR believes it appropriate to afford access to the 4.9 GHz band to utilities, railroads, metropolitan transit systems, pipelines, private ambulance companies, volunteer fire departments, and non-profit organizations that offer emergency road service "because those entities do provide essential services and critical infrastructure to the public, and because the facilities and operations of those entities may be directly involved in emergency situations." AAR Comments in *4.9 GHz Proceeding* (filed July 8, 2002) at 3. AAR maintains that "such entities need reliable communications in order to prevent or respond to disasters or crises affecting their service to the public." *Id.* at 4.

[96] *4.9 GHz Proceeding,* 17 FCC Rcd at 3972 ¶ 36.

B. Reduced Congestion and Interference Avoidance

Concern about the ability of the designated industries' to have access to spectrum was but one of the concerns reflected in the *NTIA Report*. All three industries agreed and informed NTIA that spectrum they currently use is either congested or quickly approaching critical mass, thus leading to problems of interference.[98] Accordingly, their second concern related to problems of spectrum congestion and interference. This subsection addresses Commission actions aimed at reducing and eliminating spectrum congestion and interference.

1. Rulemaking Proceedings Examining Interference

a. 900 MHz MAS

The *NTIA Report* indicates that congestion and interference is a concern in the 900 MHz band.[99] Specifically, UTC comments that "as private wireless spectrum grows more congested, there are increasing reports of harmful interference to energy activities, including critical power restoration.[100] In *WT Docket No. 97-81,* the Commission addressed general concerns about congestion in the 900 MHz band.[101] MAS is point-to-multipoint, multipoint-to-point radio communications services that consists of 3.2 megahertz of spectrum in the 928/952/956 MHz, 928/959 MHz, and 932/941 MHz bands ("900 MHz band").[102]

Historically, MAS spectrum has been used by the energy industry for various alarm, control, interrogation, and status reporting requirements,[103] but has also served an important role in the transportation industry.[104] Some railroads are using the frequencies in the MAS spectrum for SCADA operations involving the remote control of switches and signals along the rail right-of-way.[105] Of consequence to the designated industries, the Commission set aside frequencies in the 928/952/956 MHz bands for "private internal" use, *i.e.*, "where licensees use their authorized frequencies purely for internal business purposes or public safety communications and not on a for-hire or for-profit basis."[106] Aiming to further reduce congestion problems,[107] the Commission reserved twenty of the forty channel pairs in the 932/941 MHz bands for public safety/Federal

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[97] *See id.* at 3970-73 ¶¶ 31-38.

[98] *See NTIA Report* at xviii.

[99] *Id.* at 3-19 to 3-20.

[100] *See id. citing* UTC Comments filed with NTIA at 18.

[101] *See 900 MHz MAS Order,*15 FCC Rcd at 11968 ¶¶ 30- 31.

[102] Licensed under Parts 22 and 101 of the Commission's Rules. 47 C.F.R. Parts 22 and 101.

[103] *900 MHz MAS Order,*15 FCC Rcd at 11960 ¶ 4.

[104] *Id.* at 12039, Appendix C, ¶ 8.

[105] AAR Comments to *WTB PN*, Attachment at 21.

[106] *See 900 MHz MAS Order*, 15 FCC Rcd at 11967 ¶ 28.

[107] *Id.* at 11971-73.

Government and private internal services.[108] Also, for geographic area licenses, the Commission generally prohibited licensees from exceeding a signal strength of 40 dBuV/m at their service area boundaries in order to guard against potential interference.[109] Accordingly, the proceeding exemplifies the Commission's efforts to address the needs and concerns of private internal users, such as the energy, water and railroad industries.

b. 800 MHz Public Safety Interference

In addition to noting that congestion and interference is a concern in the 900 MHz band, the *NTIA Report* similarly avers that congestion and interference is problematic in the 800 MHz band as well. Specifically, the designated industries are experiencing interference on their PLMR channels.[110] Accordingly, the designated industries seek to alleviate their claim of congestion[111] in the 800 MHz band.

Recently, the Commission began a reexamination of the 800 MHz band.[112] In this proceeding, the Commission seeks to avoid interference in the band with nonpublic safety users, including the designated industry entities. As part of this reexamination, the Commission is considering various potential solutions that would avoid interference with 800 MHz communications systems. This band[113] is important for PLMR communications because it allows for the operation of systems that typically provide communications to and among vehicular or hand-held mobile units used in situations in which responders are scattered throughout a large

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[108] *Id.* at 11958. Of the 20 reserved channels, five were set-aside exclusively for public safety/Federal Government services. *Id.*

[109] *Id.* at 11998 ¶ 100. Geographic area licensees may agree to a higher signal strength at their service boundaries. The Commission also required the equivalent signal strength protection of any incumbent licensees concerning interference rights. *Id.*

[110] *See NTIA Report* at 3-20, 4-6, 5-8.

[111] *Id.* at xviii.

[112] *See 800 MHz NPRM,* 17 FCC Rcd 4873 (2002).

[113] The initial allotment to public safety was 50 channels. *See* Amendment of Part 90 of The Commission's Rules to Designate Frequencies in the 806-821 and 851-866 MHz Bands for Slow-Growth Land Mobile Radio Systems of Utilities and Public Safety Agencies, PR Docket No. 79-191 *Report and Order*, 48 Rad. Reg. 2d (P&F) 837, FCC 80-663 (Nov. 25, 1980). This allotment was later increased to 70 channels. *See* Amendment of Part 90 of the Commission's Rules to Release Spectrum in the 806-21/851-866 MHz Bands and to Adopt Rules and Regulations Which Govern Their Use. Amendment of Part 90 of the Commission's Rules to Facilitate Authorization of Wide-Area Mobile Radio Communications Systems. An Inquiry Concerning the Multiple Licensing of 800 MHz Radio Systems ('community repeaters'); Amendment of Section 90.385(c) of the Commission's Rules to Allow Transmission of Non-Voice Signals at 800 MHz, PR Docket No. 79-191, PR Docket No. 79-334, PR Docket No. 79-107, PR Docket No. 81-703, *Second Report and Order*, 52 Rad. Reg. 2d (P&F) 11, FCC 82-338 (1982). Subsequently, the Commission added 225 25 kHz channels spaced 12.5 kHz apart and 5 25 kHz channels spaced 25 kHz apart at 866-869 MHz - the so-called "NPSPAC Channels."

geographic area.[114] The designated industries rely on the 800 MHz band for mission-critical control and support of their basic services.[115]

The Commission initiated this proceeding in response to an increasing number of reports of interference to public safety systems over the past several years.[116] The reports are most frequently from public safety licensees who experience interference from commercial systems using cellular architecture. Moreover, since the terrorist attacks of September 11th, implementation of an effective Homeland Security program is placing increased demands on public safety communications capabilities, as many jurisdictions are planning or already are implementing wide-area 800 MHz band public safety systems.[117] These developments, coupled with the fact that the Commercial Mobile Radio Service (CMRS) is expected to continue to grow steadily over the next several years, indicate that interference will be an even larger problem than currently exists, unless appropriate measures are taken.[118]

In the *800 MHz NPRM*, the Commission intends to obtain solutions to these and related issues.[119] Currently, the Commission allows for use of the 800 MHz band of spectrum for public safety or non-public safety purposes on adjacent channels, depending upon the frequency.[120] The Commission is exploring all available interference reduction options for this band, including band restructuring,[121] increasing the amount of spectrum for public safety purposes,[122] establishing specific receiver standards,[123] and establishing guard bands similar to those used in the 700 MHz band.[124] Moreover, the Commission is considering two specific reallocation proposals[125] and whether measures such as a spectrum audit, currently underway on the land mobile frequencies

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[114] *See 800 MHz NPRM,* 17 FCC Rcd 4873, 4880 ¶ 11.

[115] *See, e.g., 800 MHz NPRM*, WT Docket No. 02-55, Comments of Sioux Valley Southern Electric at 2 (filed May 6, 2002).

[116] *800 MHz NPRM,* 17 FCC Rcd at 4873 ¶ 1.

[117] *Id.* at 4883 ¶ 18.

[118] *See* 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 and Order and Third Report and Order*, 15 FCC Rcd 19844, Appendix G (2000). Currently, at 800 MHz, there is no guard band of the kind that the Commission established adjacent to the 700 MHz public safety allocation.

[119] *800 MHz NPRM,* 17 FCC Rcd 4873.

[120] *See id.* at 4876-80 ¶¶ 6-10.

[121] *Id.* at 4884-88 ¶¶ 20-26.

[122] *Id. at 4890-91 ¶ 29*.

[123] *Id.* at 4913 ¶ 74.

[124] *Id.* at 4914 ¶ 78.

[125] *Id.* at 4884-88 ¶¶ 20-25. The Commission also solicited other reallocation proposals.

below 512 MHz, would be of value in the 800 MHz band.[126] Generally, the designated industries want solutions to solve interference problems while encouraging innovative developments.[127] This proceeding represents the latest in a long-standing Commission recognition that the public safety community requires effective radio communications systems free of harmful interference if the safety of lives and property are to be protected.[128] In sum, the Commission began this proceeding to address the highlighted interference concerns.

2. Promoting Efficiencies in Use of Spectrum

Although the designated industries have identified congestion and harmful interference as concerns, the Commission has several tools at its disposal to resolve these concerns. In addition to rulemaking proceedings addressing congestion and harmful interference concerns, the Commission has also effectively employed refarming and band manager policies.

a. Refarming

The Commission's "refarming" policies represent a major Commission commitment to realize reduced congestion and interference avoidance. All spectrum users, including entities in the designated industries, benefit by this set of Commission policies which result in more efficient, flexible use of the spectrum in the PLMR allocations. Efficient, flexible use of spectrum through refarming is important because the majority of the spectrum used by designated industry users is shared with other users, with Commission rules differing somewhat by the various spectrum bands, for technical reasons.[129] In the Commission's "refarming" proceeding,[130] the Commission adopted three key measures that are significant for purposes of meeting the spectral needs of the designated industries. First, to promote more efficient use of PLMR spectrum below 512 MHz,[131] channels in the 450-470 MHz band that were 12.5 kHz removed from regularly-assignable channels and reserved for low power operation[132] were reclassified as regularly assignable channels available for high power operation. Second, the Commission consolidated twenty private radio services into two frequency pools—public safety and industrial/business (I/B).[133] By reducing the number of pools to two, the Commission ensured the

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[126] *Id.* at 4890-91 ¶ 29. *See* Sec. II.A.3, *supra,* for additional information on the audit affecting licensees of frequencies below 512 MHz.

[127] *See, e.g., 800 MHz NPRM,* WT Docket No. 02-55, Comments of the United Telecom Council at i (filed May 6, 2002).

[128] *800 MHz NPRM,* WT Docket No. 02-55, 17 FCC Rcd 4873.

[129] *See* note 48, *supra.*

[130] *See generally Refarming Second Report and Order,* PR Docket No. 92-235, 12 FCC Rcd 14307 (1997).

[131] 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 Radio Services, PR Docket No. 920235, *Report and Order and Further Notice of Proposed Rule Making,* 10 FCC Rcd 10076, 10081 (1995) (*Refarming First Report and Order*).

[132] *See* 47 C.F.R. § 90.267 (1994).

[133] *Refarming Second Report and Order,*12 FCC Rcd at 14309 ¶¶ 2-3. Generally, eligibility for a Public Safety Pool channel license extends to those who were eligible in the former Public Safety Radio Services

most efficient distribution of the additional channels created as a result of the transition to narrowband technology. It also permitted better utilization of technologically innovative and efficient equipment, and reduced administrative burdens.[134] For example, this approach eliminated the need for license applicants to go through interservice sharing procedures in order to obtain authorization to operate on frequencies available in other radio services.[135] This in turn allows users to get on the air sooner as well as saves them from having to pay more than one coordination fee.[136] Third, the Commission provided specific benchmarks after which equipment would not be certified unless it met increasingly stringent efficiency standards.[137]

Implementation of the Commission's refarming policies promotes better utilization of spectrum. To the extent that the Commission's refarming policies have "made more room" for those who need spectrum, its policies have achieved the functional equivalent of making available additional spectrum and reducing interference, which benefits the designated industries.[138]

b. Band Managers

By applying the innovative regulatory concept of "band managers," which essentially act as "next generation" frequency coordinators, the Commission has created an additional mechanism to more efficiently manage spectrum and meet the current and future needs of spectrum users. A holder of a band manager license[139] may lease to third parties the holder's right to use the holder's licensed spectrum through private, contractual agreements, without

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or the former Special Emergency Radio Service. Generally, eligibility for I/B Pool channel licenses extends to those persons primarily engaged in operations of commercial, educational, philanthropic, ecclesiastical or medical activities. *See* 47 C.F.R. § 90.35(a).

[134] *Refarming Second Report and Order*, 12 FCC Rcd at 14309 ¶ 3.

[135] *Id.* at 14317 ¶ 19.

[136] *Id.*

[137] *See* 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 Radio Services, PR Docket No. 92-235, *Report and Order and Further Notice of Proposed Rule Making,* 10 FCC Rcd 10076, 10081 (1995). The Commission is currently considering whether to revise these rules to further encourage migration to narrowband technology. *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, WT Docket No. 99-87; RM-9332; RM-9405; RM-9705, 15 FCC Rcd 22709, 22772 (2000).

[138] Also, the Commission currently is considering a pending petition by AMTA, which calls for the Commission to adopt dates certain after which non-Public Safety licensees on certain frequencies governed by Part 90, 47 C.F.R. Part 90, would be afforded only secondary status on their channels unless they have implemented equipment meeting certain spectrum efficiency standards. *See* Promotion of Spectrum Efficient Technologies on Certain Part 90 Frequencies, *Petition for Rulemaking* (filed June 19, 1998).

[139] *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, WT Docket No. 02-08; RM-9267; RM-9692; RM-9797; RM-9854; RM-9882; *Notice of Proposed Rule Making*, FCC 02-152 ¶ 36 (2002).

having to secure prior approval by the Commission.[140] In effect, each band manager is granted a "systems" or "blanket" license that allows it to construct/operate, or allow others to construct/operate, stations at any available site within the licensed area and on any channel for which it is licensed. Under this licensing approach, the band manager performs not only a valuable frequency coordination function,[141] but it is also directly responsible for any interference or misuse of its licensed frequency.[142] Additionally, it must terminate any operation causing harmful interference.[143]

Band manager rules are not uniform across all bands due to technical reasons and other issues; however, the general approach is consistent across bands. As a market-based mechanism, band manager licensing can create incentives for efficient use of spectrum. By aggregating use amongst like users, band managers can avoid some of the interference issues that concern entities in the designated industries. By utilizing band managers, private users have greater flexibility to access spectrum in amounts of bandwidth, periods of time, and geographic areas that best suit their needs.[144] Band manager licensing can help to alleviate the spectrum concerns of users with smaller and/or more localized spectrum needs,[145] and it can reduce transactional costs and regulatory burdens associated with traditional licensing.[146] For example, various companies in the designated industries with similar wireless communications needs might secure their requirements from the same band manager, who could meet their technical communications requirements and take on licensing obligations that they would have otherwise had to incur if they otherwise had secured communications authority on their own. As their respective communications needs change, the companies could rapidly alter their communications services, securing new arrangements with the same or a different band manager, while being free themselves from any license change obligation.

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[140] *Id.* The Commission's Secondary Markets proceeding may alter this framework by using band manager licensing as a vehicle for promoting wider use of the leasing of spectrum usage generally. *See* Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets, WT Docket No. 00-230, *Notice of Proposed Rulemaking*, 15 FCC Rcd 24203, 24204, 2409, 24212 (2000).

[141] *4.9 GHz Proceeding,* 17 FCC Rcd at 3978.

[142] 47 C.F.R. § 27.4.

[143] 47 C.F.R. § 27.602 (e)-(f).

[144] Implementation of Section 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 900 MHz, Petition for Rule Making of the American Mobile Telecommunications Association, WT Docket No. 99-87, RM-9332, RM 9405, RM-9705, *Report and Order and Further Notice of Proposed Rulemaking*, 15 FCC Rcd 22709, 22710 (2000) (*BBA Report and Order & NPRM).*

[145] Amendments to Parts 1, 2, 27 and 90 of the Commission's Rules to License Services in 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, WT Docket No. 02-8, *Report and Order*, FCC 02-152 ¶ 15 (rel. May 24, 2002), 67 FR 41847 (June 20, 2002) (*27 MHz Service Rules Order*).

[146] *BBA Report and Order & NPRM,* 15 FCC Rcd at 22729.

The Commission has applied the concept of band managers to licensing in the 700 MHz[147] and Government Transfer Bands.[148] Moreover, the Commission is actively considering expansion of the application of the band manager concept in ongoing rulemaking proceedings, such as those for the 71-76 GHz, 81-86 GHz and 92-95 GHz bands,[149] the 800 MHz public safety band,[150] and the 4.9 GHz band.[151] Accordingly, implementation of the band manager concept promotes effective and efficient spectrum use and the development of more efficient spectrum markets, from which all spectrum users, including the designated industries, benefit.

3. Flexibility in Rules

The Commission has sufficient flexibility in its rules to resolve congestion and interference concerns resulting from unusual or extraordinary circumstances. Specifically, the Commission may use rule waivers [152] and grants of Special Temporary Authority (STA)[153] when such methods would serve the public interest. Notably, the Commission may grant a waiver on its own motion or pursuant to the request of an applicant or licensee when unusual or extraordinary circumstances exist.[154] However, the Commission must receive an STA request before it may authorize an applicant or licensee to operate radio facilities in unusual or extraordinary circumstances. Thus, the congestion and interference concerns can be addressed through rule waivers and STAs in appropriate situations.

a. 900 MHz Ribbon License

In seeking to reduce congestion, avoid interference, and best address spectrum needs generally, the Commission has been modifying its rules to promote flexibility and has granted requests for modifications to licenses when it can be shown that there are significant public safety benefits or it is otherwise in the public interest. For example, in 2000, the AAR requested a modification of its licenses in the 900 MHz band into a single nationwide geographic area license.[155] Last year the Commission's Wireless Telecommunications Bureau granted a waiver of

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[147] *700 MHz First Report and Order*, 15 FCC Rcd 476 (2000); *700 MHz Second Report and Order,* 15 FCC Rcd 5299 (2000).

[148] *27 MHz Service Rules Order*, FCC 02-152 ¶ 40.

[149] *70/80/90 GHz Proceeding,* WT Docket No. 02-146, RM-10288 ¶ 79.

[150] *800 MHz NPRM,* 17 FCC Rcd 4873, 4911 ¶ 70 (2002).

[151] *4.9 GHz Proceeding*, 17 FCC Rcd at 3978-79.

[152] *See* 47 C.F.R. §§ 1.3, 1.925 (Permits waiver of the Commission Rules in extraordinary or unusual circumstances).

[153] *See* 47 U.S.C. § 309(f); 47 C.F.R. § 1.931(b).

[154] *See* 47 C.F.R. §§ 1.3, 1.925.

[155] The six frequency pairs involved were 896.8875/935.8875 MHz, 896.9375/935.9375 MHz, 896.9875/935.9875 MHz, 897.8875/9375 MHz, 897.9375/936.9375 MHz, and 897.9875/936.9875 MHz.

the Commission's rules to permit AAR's license modification.[156] AAR represents virtually every major American railroad and is the licensee of over three hundred PLMR call signs in connection with a Positive Train Control system.[157] Such systems, as indicated earlier, are designed to prevent train collisions, high-speed accidents, and incursions into locations reserved for railway workers.[158] AAR requested modification of its licenses in the 900 band, into a single nationwide geographic area license.[159]

Before the license modification grant, AAR had to file and the Commission had to review an individual modification application every time a Positive Train Control station was relocated, as only site-by-site authorizations existed for the six specific Positive Train Control frequency pairs in the 900 MHz band.[160] The waiver grant produced a number of benefits for railroad operations. Primarily, the waiver grant provided a 140-mile protected zone that ensured harmful interference to railroad operations would not become a concern.[161] Additionally, the Bureau recognized that if the request were granted, there would be greater administrative efficiencies gained both for the Commission and AAR, and potential improvements to safety of train operations. Finally, the Bureau recognized that grant of the modification would facilitate the deployment of an efficient, ubiquitous, and internationally coordinated[162] railroad communications system.[163]

In granting the modified license, the Bureau authorized a 140-mile wide swath or "ribbon" that tracks all of the railroad rights-of-way in the United States (*i.e.,* a 70-mile zone extends in each direction from the track), thus replacing AAR's site-by-site licenses in the 900 MHz band.[164] Providing ample flexibility, the grant generally permitted AAR to locate, move, or modify its stations anywhere within its 140-mile wide geographic area without obtaining additional Commission consent.[165] The grant provided for a unique approach to meet the spectrum communications requirements of the railroad industry in a dynamic spectrum environment.

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[156] *See, e.g.,* Petition of Association of American Railroads (AAR) for Modification of Licenses For Use in Advanced Train Control Systems and Positive Train Control Systems, *Order*, 16 FCC Rcd 3078, 3083 ¶ 11 (WTB 2001) (*AAR Order)*.

[157] Some years ago, such systems were generally referred to as "Advanced Train Control Systems."

[158] *AAR Order,* 16 FCC Rcd at 3078 ¶ 2.

[159] *See id.* ¶ 1.

[160] *See id.* at 3079-82 ¶¶ 4, 6-7.

[161] *See id.* at 3081 ¶ 10.

[162] A modification would allow U.S. licensing to conform with that of the Canadian government. *Id.* at 3080 ¶ 7.

[163] *Id.* at 3081-83. For additional system description, *see* Sec. I.C., *supra.*

[164] *Id.*

[165] *Id.*

b. Special Temporary Authority

Another tool to meeting dynamic spectral needs, is the use of its statutorily-based STA.[166] Under existing Commission rules, the designated industries have the capability to have their most pressing needs for the operation of private radio facilities satisfied by obtaining an STA from the Commission.[167] Commission rules on STAs allow immediate or temporary operation of radio facilities for restoration of existing facilities to continue communications service, during natural disasters, emergencies or when other urgent conditions are present.[168] In emergency situations, STA requests need not be made through a written application process; but, rather, may be submitted to the Commission by telephone, telegram, or fax.[169] Granted with fixed, short-term expiration dates not exceeding 180 days, STAs may be renewed for an additional period if circumstances warrant an extension.[170] Thus, under extraordinary circumstances where time is of the essence, the Commission has in place a regulatory process that is sufficiently flexible to be responsive to the designated industries' communication needs.[171]

The *NTIA Report* states the important role that these designated industries played in the aftermath of the September 11th terrorist attacks.[172] During this time, although no requests for STAs were received from the Washington, D.C. area, the Commission granted all 15 requests it received for STAs in surrounding areas of the World Trade Centers. [173] Clearly, the Commission has flexible procedures in place to address emergency and unusual circumstances regarding access to spectrum, congestion and interference, etc.

C. Keeping Pace with the Future

The third major area of concern reflected in the *NTIA Report* addressed the ability of new technologies to meet the spectrum needs of the designated industries.[174] In this regard, NTIA

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[166] *See* 47 U.S.C. § 309(f).

[167] 47 C.F.R. § 1.931(b) (STAs for private wireless services). STAs are also available for wireless telecommunications services. *See* 47 C.F.R. § 1.931(a).

[168] *See id.*

[169] *See* 47 C.F.R. § 1.915(b)(1)(i)-(iii).

[170] *See* 47 C.F.R. § 1.931(b).

[171] The Wireless Telecommunications Bureau granted over 1700 STAs for use in the aftermath of September 11th. Information provided by the Licensing & Technical Analysis Branch of the Commission's Public Safety and Private Wireless Division.

[172] When the World Trade Center collapsed, utilities needed to be shut off or restored. NTIA Report at xxi. It was important for sufficient water pressure to be continuously available for firefighting. *Id*. People and commerce relied more on the railroad industry for transportation when the airlines were not able to fly their routes. *Id*.

[173] The Commission's Wireless Telecommunications Bureau granted STAs to: commercial carriers to restore wireless communications services; state and local governments to assist in rescue efforts; allow modification of licenses to restore communications; and allow use of additional frequencies to increase airport security.

[174] *NTIA Report* at xvii-xviii.

inquired about the use of non-spectrum dependent alternative technologies or commercial services that are currently available.[175] For the most part, commenters to the *NTIA Report* stated that commercial wireless services did not adequately service their needs due to issues of compatibility, reliability and cost-effectiveness.[176] Additionally, many commenters to the *NTIA Report* found that fiber optic and/or wireline networks were not practicable because they do "not provide the mobility that spectrum dependent equipment does"[177] and they are not as cost effective as radio-based systems.[178] This section will discuss a few areas of future opportunity.

1. Access to Satellite Services

Although *NTIA Report* and the record do not fully address the availability and usage of commercial or civil satellites services by the designated industries, such spectrum-based technologies are available for use by the energy, water and railroad industries.[179] These industries have access to various commercial and government satellite systems that can be used to transmit and/or receive communications (voice, video and data), navigational, location, imaging and weather satellite services. For example, communications satellites can transmit business data, oil and gas deposits can be identified through a combination of satellite imagery and other geological data, and the GPS service can provide information to locate and navigate railroad cars. There are various methods available to access such satellite systems and services. For example, with respect to commercial satellite services, designated industries could operate as a satellite provider, lease capacity from an existing provider, or purchase services from a satellite provider.

2. 70/80/90 GHz Bands

Recently, the Commission initiated a proceeding to encourage the development of technologies that would effectively make 13 gigahertz of additional, useable spectrum available in the 71-76 GHz, 81-86 GHz and 92-95 GHz bands (70/80/90 GHz Bands).[180] Generally, this spectrum is currently unavailable to companies, including energy, water and railroad entities. To date, the highest frequencies on which the Commission authorizes licensed services are in the 48.2-50.2 GHz band,[181] and the highest frequencies in which unlicensed devices may operate is in the 76-77 GHz band.[182] Under requirements currently in place, radio technology that operates

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[175] *See id.* Sec. 3, at 3-23. The *NTIA Report* states that commenters to NTIA "provided no information or data on the viability of commercial geographic position and automatic location data systems (*e.g.,* LoJACK and Global Positioning Systems). However, energy providers would like to transmit location data that is determined by geographic position technology or other means, automatically or on demand, to other locations." *Id.* at 3-22.

[176] *Id*. Sec 3, at 3-23 through 3.24.

[177] *Id*.

[178] *Id*.

[179] *See*, *e.g*., *Orbital Communications Corporation*, Order and Authorization, 13 FCC Rcd 10828 (1998*);* see also *Space Imaging L.P*., Order and Authorization, 10 FCC Rcd 10911 (1995); Dept. of Defense, Global Positioning System (GPS) 2000, A Report to Congress (Oct. 2000).

[180] *70/80/90 GHz Proceeding*, WT Docket No. 02-146, RM-10288, FCC 02-180.

[181] 47 C.F.R. § 25.202(a)(1).

[182] 47 C.F.R. § 15.253.

above 50.2 GHz may not be licensed except on an experimental basis under Part 5 of the Commission's rules.[183]

This spectrum may be suitable to meet some of the communications needs of the energy, water and railroad entities. Advances in microchip technology, and the special propagation characteristics of the 70/80/90 GHz Bands, provide a new environment for the development and market of new applications in these bands.[184] Because of shorter wavelengths, the 70/80/90 GHz Bands permit the use of smaller antennas than would be required for similar circumstances in the lower bands, to achieve the same high directivity and high gain.[185] The immediate consequence of this high directivity, coupled with the high free space loss at these frequencies, is the possibility of a more efficient use of the spectrum for point-to-multipoint applications.[186] Since a greater number of high directive antennas can be placed in a given area than less directive antennas, the net result is higher reuse of the spectrum, and higher density of users, as compared to lower frequencies.[187] Furthermore, due to the fact that one can place more voice channels or broadband information using a higher frequency to transmit the information, this spectrum could potentially be used to supplement or even replace fiber optics.[188]

A similar approach was previously followed by the Commission that benefited the designated industries. In 1985, the opening of certain bands to spread spectrum technology on an unlicensed basis stimulated rapid private sector development of that technology. Today, numerous companies use many spread spectrum devices for such diverse applications as remote meter reading, utility load management and voice-secure cordless telephones.[189] Similarly, energy, water and railroad entities may find the 70/80/90 GHz bands attractive for their communications needs.

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[183] 47 C.F.R. § 5.01 *et seq*. These rules permit simplified licensing of spectrum for experiments that would not otherwise be permitted under the Commission's rules. In general, equipment may not be marketed in connection with such experiments and service may not be provided for commercial use. However, there are provisions for "limited marketing studies" that permit marketing on a small scale. *See* 47 C.F.R. § 5.93.

[184] *70/80/90 GHz Proceeding*, WT Docket No. 02-146, RM-10288, FCC 02-180, ¶ 5.

[185] For a given beamwidth (directivity), the required antenna size scales inversely with frequency. Thus a 45 GHz antenna would be twice as large as a 90 GHz antenna with the same beamwidth and a 22.5 GHz antenna would be four times as large as a 90 GHz antenna with the same diameter.

[186] *70/80/90 GHz Proceeding*, WT Docket No. 02-146, RM-10288, FCC 02-180 ¶ 6.

[187] *Id.*

[188] *Id.*

[189] *Id.* ¶ 10. *See* Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies, *First Report and Order and Third Notice of Proposed Rule Making,* 7 FCC Rcd 6886 (1992) (reallocating portions of the 2 GHz from fixed microwave services to emerging technology systems, including personal communications services (PCS)); *see* Authorization for Spread Spectrum and Other Wideband Emissions not Presently Provided for in the FCC Rules and Regulations, *First Report and Order,* Gen. Docket No. 81-413, 101 FCC 2d 419 (1985) (adopting rules in Part 15 for low power spectrum devices).

3. Commercial Alternatives: 800 MHz

In the *800 MHz Proceeding,* the Commission currently is examining, among other things, the extent to which commercial wireless technology can meet the needs of entities that may operate in the 800 MHz band, which include the designated industries.[190] In the comments filed with the Commission on the *NTIA Report,* the dominant view of those representing the designated industries is that commercial mobile radio services (CMRS) alone are inadequate to fulfill their communications requirements. Some argue for an allocation of additional spectrum for utilities or critical infrastructure entities.[191] A number of commenters emphasized the need for utilities to have reliable communications.[192] Commenters noted that commercial wireless providers typically do not design their networks for redundancy, unlike utilities, whose communication systems are less likely to be negatively affected by adverse conditions.[193] Moreover, they noted that commercial systems do not always provide service throughout their operating areas,[194] are not necessarily capable of providing priority access, and tend to become saturated, sometimes unusable, during emergency periods.[195] Accordingly, most commenters contend that commercial wireless systems are an inadequate substitute for utilities' private wireless systems. Only a few take an opposite[196] or otherwise different view.[197] In the *800 MHz NPRM* proceeding, the

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[190] *800 MHz NPRM*, 17 FCC Rcd 4873 (2002).

[191] *See, e.g.,* API Comments to *WTB PN* at 6-14, UTC Comments to *WTB PN* at 15-17; Cinergy Comments to *WTB PN* at 13-16; ConEd Comments to *WTB PN* at 14-18; WGP Comments to *WTB PN* at 5; DPLC&ACE Comments to *WTB PN* at 13-16; SCANA Comments to *WTB PN* at 13-16.

[192] *See* ConEd Comments to *WTB PN* at 29; *See* DPLC&ACE Comments to *WTB PN* at 27; *See* Entergy Comments to *WTB PN* at 26-27; *See* SCANA Comments to *WTB PN* at 27-28.

[193] *Id.*

[194] ConEd Comments to *WTB PN* at 28-29; DPLC&ACE Comments to *WTB PN* at 26; Entergy Comments to *WTB PN* at 27; SCANA Comments to *WTB PN* at 27.

[195] *See* ConEd Comments to *WTB PN* at 12-13; Entergy Comments to *WTB PN* at 12-13.

[196] Only a few commenters take an opposing view. Nextel argues that the designated industries rely on commercial systems, and that there is enormous potential for leveraging the extensive nationwide network infrastructure developed by commercial carriers to provide advanced wireless communications for the designated industries. Nextel Comments to *WTB PN* at 2-3. Both Nextel and AMTA indicate that there is no technical barrier that precludes commercial services from satisfying such needs. *See* Nextel Comments to *WTB* at 2-3; AMTA Reply Comments to *WTB PN* at 6-7. Nextel argues that "technology exists to offer critical infrastructure users priority access" (Nextel Comments to *WTB PN* at 6) and states that Southern LINC, a commercial provider in the southeastern United States, provides priority access for its utility-based customers. *Id.* at 6, n.3. However, Nextel concedes that in many instances, the needs of critical infrastructure industries are not being met by standard commercial services. Nextel Reply Comments to *WTB PN* at 5.

[197] A "middle view" is represented by Southern, who argues that certain types of CMRS can satisfy critical communications needs. Southern argues that generally, commercial wireless providers are not currently meeting the unique needs of the designated industries (*see generally* Southern Comments and Reply Comments to *WTB PN*); however, it argues that its operating utilities successfully use Southern LINC, an affiliated commercial carrier, for the majority of its commercial needs. Southern Reply Comments to *WTB PN* at 3. Southern maintains that Southern LINC is highly differentiated from other commercial carriers, and that those differences are what make it a viable alternative to utilities' private systems. *Id.*

Commission notes that there has been a significant growth in CMRS, and that some of these technologies may be suitable for meeting the more routine public safety communications needs.[198] The Commission has asked those who may question the sufficiency of public safety spectrum to take into account technological and regulatory developments that have occurred in recent years.[199] The Commission is considering the technological and regulatory developments with regards to the communications requirements of its licensees and may adopt rules to promote improvements in efficiency and performance of 800 MHz equipment.[200]

III. CONCLUSION

Although the *NTIA Report* did not validate specific spectrum requirements for the energy, railroad and water industries, the Commission always is sensitive to the communications needs of these and other industries. Energy, water and railroad interests are critical to the nation's infrastructure and rely on radio spectrum to perform core operations, ranging from routine monitoring to emergency responses. These interests have raised concerns about their ability to access and use spectrum due to congestion and interference. The designated industries are encouraged to continue to migrate to more efficient technologies and to make use of available commercial spectrum services when practicable, including terrestrial wireless and satellite services, as well as civil satellite services. They are also encouraged to utilize new methods of sharing and licensing to meet their needs, to ensure that efficient and effective use of spectrum is achieved. The Commission must satisfy the spectrum needs of many users, and it is especially

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[198] *800 MHz NPRM,* 17 FCC Rcd at 4890 ¶ 29. CMRS carriers are permitted to offer public safety entities priority access service on a voluntary basis. *See* Development of Operational, Technical and Spectrum Requirement of Meeting Federal, State and Local Public Safety Agency Communication Requirements Through the Year 2010; Establishment of Rules and Requirements For Priority Access Service, WT Docket No. 96-86, *Second Report and Order*, 15 FCC Rcd 16720, 16728 ¶ 17 (2000); *see also* Voicestream Wireless Corp., Petition for Waiver of Section 64.402 of the Commission's Rules WT Docket No. 01-333, *Memorandum Opinion and* Order, FCC 02-84 (rel. April 3, 2002).

[199] *800 MHz NPRM,* 17 FCC Rcd at 4890 ¶ 29.

[200] Further, the Commission is considering a petition by the High Speed Rail Safety Coalition, which has requested amendments to the Commission's rules in order to permit expeditious deployment of Positive Train Control systems for high-speed rail service. *See* Petition for Rulemaking, Jeffrey H. Olson, Esq. of Paul, Weiss, Rifkind, Wharton & Garrison, on behalf of High-Speed Rail Safety Coalition (HSRC) (filed Dec. 4, 1998) at i ("Petition"). Commission action on the petition has been delayed at HSRSC's request, which made the request to ensure that the regulatory scheme posed by the HSRSC petition is adequate to cover potential technical modifications. Mar. 9, 2001 letter from Jeffrey H. Olson, Esq., on behalf of HSRSC, to Bruce Franca, Office of Engineering and Technology, FCC at 2. Positive Train Control equipment are claimed to enable trains to receive time-critical safety information and override operating systems in the event of human or mechanical failure. Petition at i. The equipment's transmitter, located underneath the locomotive, queries transponders, located at various points in the track bed, using a signal at 27.115 MHz. The transponder responds with a data burst in the 4.5 MHz band. While members of the railroad industry view use of the equipment as "critical to the safe operation of high-speed rail service" (*Id.* at 1.), they indicate that they are unable to deploy it because it does not "correspond to any existing Commission allocation" (*Id.* at ii.) or otherwise "fit into any regulatory category presently established by the Commission's rules." *Id.* at 1. Because the Commission recognizes the dynamic needs of the railroad industry and rapid changes in technology, it plans to seek comment on the petition and other related public safety issues in the near future.

sensitive to needs involving domestic security concerns.[201] The spectrum needs of the designated industries as well as others must be carefully balanced. Recent and ongoing actions of the Commission, as outlined in this Report, demonstrate how the Commission is responding in the area of spectrum management to maximize the use of the airwaves, which are a finite, public resource.

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[201] On Nov. 14, 2001, the Commission has established a Homeland Security Council. The Council's mission is to: assist the Commission in evaluating and strengthening measures for protecting U.S. telecommunications, broadcasting and other communications infrastructure and facilities from further terrorist attacks; assist the Commission in ensuring rapid restoration of U.S. telecommunications, broadcast, and other communications infrastructure and facilities after disruption by a terrorist threat or attack; and assist the Commission in ensuring that public safety, health and other emergency and defense personnel have effective communications services available to them in the immediate aftermath of any terrorist attack within the United States. *See* http://www.fcc.gov/hspc/

APPENDICES

APPENDIX A
Potentially Available Spectrum for the Energy, Water and Railroad Industries[202]

Energy Industry	Water Industry	Railroad Industry
Various frequencies in the Industrial/Business Radio Pool See 47 C.F.R. § 90.35	Various frequencies in the Industrial/Business Radio Pool See 47 C.F.R. § 90.35	Various frequencies in the Industrial/Business Radio Pool See 47 C.F.R. § 90.35
150-174 MHz	150-174 MHz	150-174 MHz
216-220 MHz	216-220 MHz	216-220 MHz
450-512 MHz	450-512 MHz	450-512 MHz
746-776 MHz 776-777 MHz 792-794 MHz[203]	746-776 MHz 776-777 MHz 792-794 MHz[204]	746-776 MHz 776-777 MHz 792-794 MHz[205]
747-762 MHz 777-792 MHz	747-762 MHz 777-792 MHz	747-762 MHz 777-792 MHz
806-821/851-866 MHz 896-901/935-940 MHz	806-821/851-866 MHz 896-901/935-940 MHz	806-821/851-866 MHz 896-901/935-940 MHz
902-928 MHz	902-928 MHz	902-928 MHz
928/952/956 MHz 928/959 MHz 928/959 MZ 932-941 MHz	928/952/956 MHz 928/959 MHz 928/959 MZ 932-941 MHz	928/952/956 MHz 928/959 MHz 928/959 MZ 932-941 MHz
1390-1395 MHz: Auction 1427-1435 MHz: Different Uses as Follows: 1427-1429.5 MHz: Secondary Telemetry (WMTS primary) 1429.5-1432 MHz: Primary Telemetry 1670-1675 MHz: Auction[206]	1390-1395 MHz: Auction 1427-1435 MHz: Different Uses as Follows: 1427-1429.5 MHz: Secondary Telemetry (WMTS primary) 1429.5-1432 MHz: Primary Telemetry 1670-1675 MHz: Auction[207]	1390-1395 MHz: Auction 1427-1435 MHz: Different Uses as Follows: 1427-1429.5 MHz: Secondary Telemetry (WMTS primary) 1429.5-1432 MHz: Primary Telemetry 1670-1675 MHz: Auction[208]
2390-2417 MHz (unlicensed)	2390-2417 MHz (unlicensed)	2390-2417 MHz (unlicensed)
4.94-4.99 GHz	4.94-4.99 GHz	4.94-4.99 GHz
5925-6875 MHz 10.55-11.7 MHz	5925-6875 MHz 10.55-11.7 MHz	5925-6875 MHz 10.55-11.7 MHz
71-76 GHz 81-86 GHz 92-95 GHz	71-76 GHz 81-86 GHz 92-95 GHz	71-76 GHz 81-86 GHz 92-95 GHz

[202] Chart does not list spectrum available through commercial providers.

[203] This spectrum will be made available by leasing spectrum from the "Guard Band Managers."

[204] *Id.*

[205] *Id.*

[206] Much of the spectrum indicated in this box is to be auctioned. Entities in the energy, water and railroad industries may bid for licenses in these auctions.

[207] *Id.*

[208] *Id.*

APPENDIX B

PARTIES THAT FILED WITH THE COMMISSION EITHER COMMENTS, REPLY COMMENTS OR EX PARTE CORRESPONDENCE REGARDING THE NTIA REPORT[209]

Comments:
Aeronautical Radio, Inc. (ARINC)
American Petroleum Institute (API)
Association of American Railroads (AAR)
Cinergy Corporation (Cinergy)
Consolidated Edison Company of New York (ConEd)
Delmarva Power & Light Company and Atlantic City Electric Company (DPLC & ACE)
Entergy Services, Inc. (Entergy)
Itron, Inc. (Itron)
Metropolitan Water District of Southern California (MWD) (filed Mar. 7, 2002)
Nextel Comminations, Inc. (Nextel)
SCANA Corporation (SCANA)
SchlumbergerSema, Inc. (SchlumbergerSema)
Southern Company (Southern)
United States Department of Transportation (DOT) (filed Mar. 20, 2002)
United Telecom Council (UTC)
Wilkinsburg-Penn Joint Water Authority (WPJWA)
Williams Gas Pipeline (WGP)
Y-W Electric Association, Inc. (YW)

Reply Comments:
American Mobile Telecommunications Association (AMTA)
Cinergy Corporation (Cinergy)
Delmarva Power & Light Company and Atlantic City Electric Company (DPLC&ACE)
Dixie Electric Power Association (filed Mar.19, 2002)
Entergy Services, Inc. (Entergy)
Excelon Corporation (Excelon) (filed Apr.3, 2002)
Industrial Telecommunications Association (ITA)
LMS Wireless and Warren C. Havens (LMSW-Havens) (filed Mar. 20, 2002)
Metropolitan Water District of Southern California (MWD) (filed Mar. 19, 2002)
Mobex Communications, Inc. (Mobex)
Nextel Communications, Inc. (Nextel)
SCANA Corporation (SCANA)
Southern Company (Southern)
Wilkinsburg-Penn Joint Water Authority (WPJWA) (filed Mar. 19, 2002)
Y-W Electric Association, Inc. (YW) (filed Mar. 19, 2002)

Ex Parte Correspondence
Aeronautical Radio, Inc. (filed May. 2, 2002)
Industrial Telecommunications Association, Inc. (ITA) (filed Mar. 25, 2002)
United Telecom Council (UTC) (filed June 20, 2002).

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[209] Filing dates provided only for late or *ex parte* filings.