Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Review of the Commission's Rules Governing the 896-901/935-940 MHz Band	)	WT Docket No. 17-200
	)	

To: The Commission

FURTHER COMMENTS
OF
ENTERPRISE WIRELESS ALLIANCE
AND
PDVWIRELESS, INC.

Respectfully submitted,

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EXECUTIVE SUMMARY

> "Since at least March 2016, Russian government cyber actors – hereafter referred to as "threat actors" – targeted government entities and multiple U.S. critical infrastructure sectors, including the energy, nuclear, commercial facilities, water, aviation, and critical manufacturing sectors."[1]
>
> "The Trump administration accused Russia on Thursday of engineering a series of cyberattacks that targeted American and European nuclear power plants and water and electric systems, and could have sabotaged or shut power plants off at will. United States officials and private security firms saw the attacks as a signal by Moscow that it could disrupt the West's critical facilities in the event of a conflict."[2]
>
> "Reacting to the Trump administration's sanctions in response to the above conclusions about Russian cyberattacks, Senator Lindsey Graham stated of President Putin: "His aim is to disrupt every aspect of our lives – right down to having the ability to shut off the power in Americans' homes or businesses."[3]

The FCC is charged with addressing urgent issues, issues of national significance, on a daily basis. With respect, EWA/PDV submit that few priorities could be higher or more immediate than arming the country's critical infrastructure sectors described above with spectrum on which they can deploy broadband networks designed and operated to their exacting requirements. Broadband is essential to modernization and securitization of the national energy grid and to the other Private Enterprise ("PE") and Critical Infrastructure Industry ("CII") operations whose products and services are the foundation on which the United States relies.

The challenges faced by these organizations are not only those of cyberattack by foreign or even domestic terrorists. They are on the frontline when responding to the ravages of extreme weather conditions, whether hurricanes, fires, floods, tornadoes, or earthquakes. The National

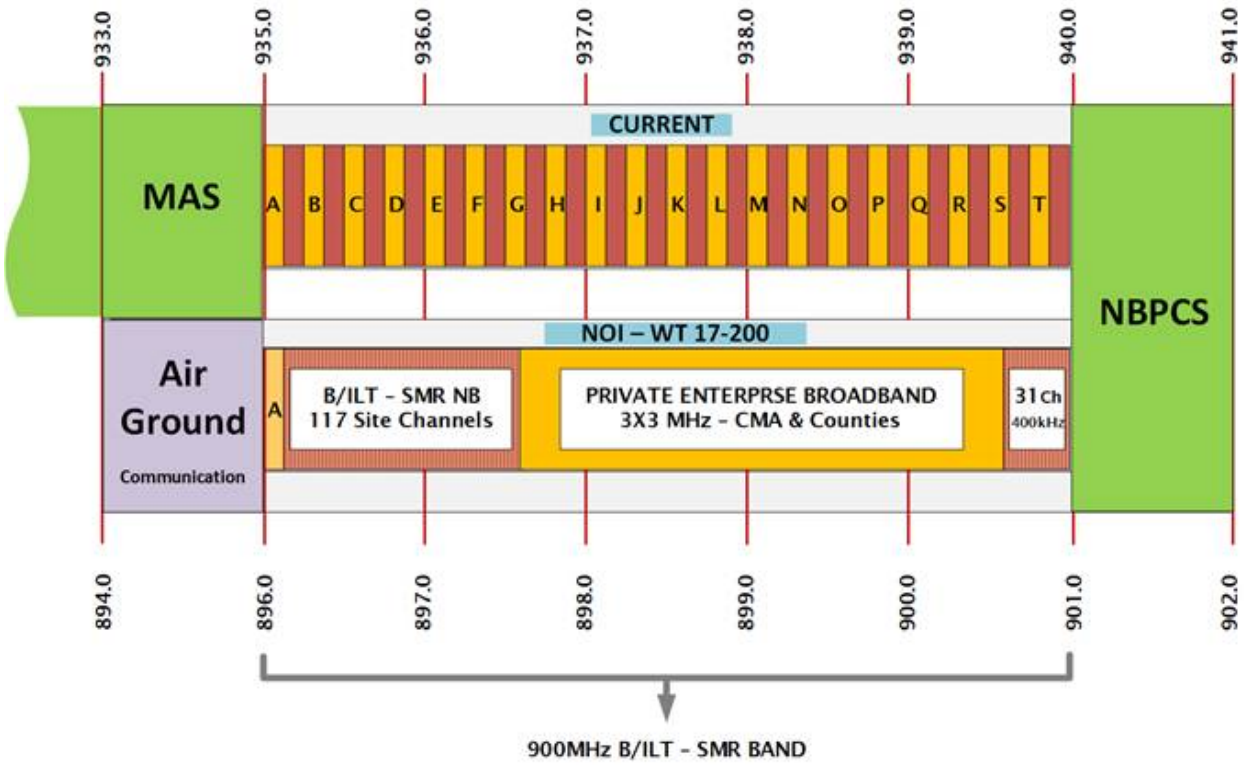
[1] Department of Homeland Security, Alert (TA18-074A) Russian Government Cyber Activity Targeting Energy and Other Critical Infrastructure Sectors, Mar. 15, 2018.
[2] Cyberattacks Put Russian Fingers on the Switch at Power Plants, U.S. Says: New York Times, Mar. 15, 2018.
[3] U.S. Sanctions Russians for Cyberattacks on Power Grid and Election Meddling, Tribune News Service, Mar. 16, 2018.

Oceanic and Atmospheric Administration described 2017 as a year of "near-biblical" weather extremes and one of the first things the public demands after catastrophic events is power restoration. Meeting those public expectations is difficult today and will become even more so as IIoT devices proliferate and place increasingly greater demands on enterprise communications networks.

Throughout this proceeding and its predecessor, RM-11738, as well as in numerous other filings at the FCC, utilities and a variety of PE/CII entities have explained why their mission-critical operations cannot be conducted on commercial broadband networks. Those networks do an extraordinary job of meeting consumer demands as well as non-critical needs of many organizations. But they lack the resiliency, reliability, coverage – and importantly the security – that are non-negotiable criteria for CII and other PE entities, in many cases criteria mandated by Federal or local regulators.

The 900 MHz Band (896-901/935-940 MHz) presents the only near-term opportunity for addressing these highly specialized broadband requirements on spectrum where mobile and fixed broadband can be deployed cost-effectively. The debate regarding the original EWA/PDV broadband proposal has been vigorous. In response to comments from supporters and opponents, and in an effort to move this proceeding forward expeditiously in light of the urgent need to deliver broadband spectrum to these entities, EWA/PDV recommend the following revisions to the original Private Enterprise Broadband ("PEBB") proposal:

- Shift the PEBB allocation down 400 kHz to 897.600-900.600/936.600-939.600. This will move the broadband allocation away from adjacent 901/940 MHz Narrowband PCS ("NPCS") systems operated by customers of Sensus America, Inc. ("Sensus"). This shift also will create an upper and lower PLMR narrowband segment, thereby allowing greater separation between co-located frequencies in narrowband systems.



The shift of the PEBB spectrum is dependent upon accommodating the Association of American Railroads ("AAR") requirements by modifying its license, WPSF894, to channels lower in the 900 MHz Band. PDV is engaged in very constructive discussions with AAR on this subject and believes an arrangement will be reached.

- Adopt an asymmetrical emission mask by adjusting the uplink (897.600-900.600 MHz) mask to the standard limit of 43 + 10 log (P) dB while retaining the 50 + 10 log (P) dB mask for downlink (936.600-939.600 MHz) spectrum. A more stringent uplink mask had been proposed to address the Sensus concern about interference to adjacent NPCS operations. This will allow PE/CII broadband users to enjoy the full ecosystem of LTE Band Class 8 subscriber devices available today in the global market.

- Issue geographic PEBB licenses based on Metropolitan Statistical Areas ("MSAs") in the top 306 Cellular Market Areas ("CMAs") and on individual counties in the remaining 428 CMAs. Unlike Major Trading Areas ("MTAs"), these smaller geographic licenses align more closely with the service areas of PE/CII entities.

- During the first year after adoption of PEBB licensing rules, allow PE/CII applicants exclusively the opportunity to secure PEBB licenses through the traditional frequency coordination process. Applicants would demonstrate to a Part 90 coordinator of their choice that they control 240 discrete 900 MHz channels in the desired MSA or county (channels for which they already are licensed, those they purchase/lease from third parties, and those they claim from FCC inventory) and secure the coordinator's certification to the

FCC that the holdings qualify to be exchanged for the 3X3 MHz (240 channel) PEBB license.

- After the one-year coordinated application period, in markets where no PE/CII entity has secured the PEBB license, conduct overlay auctions with the PEBB license awarded to the highest bidder, whether commercial or PE/CII applicant.

The Commission has an opportunity to create a broadband service on spectrum that has been allocated for more than 30 years, much of which remains entirely unused, without compromising the operations of entities that wish to continue using narrowband technology. The very users for which this spectrum was allocated are the users that will take advantage of self-provisioned broadband capabilities. EWA/PDV urge the FCC to adopt as promptly as possible a Notice of Proposed Rulemaking consistent with these recommendations and to move equally expeditiously to adoption of modernized 900 MHz Band rules.

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The Enterprise Wireless Alliance ("EWA") and pdvWireless, Inc. ("PDV") (collectively "EWA/PDV") respectfully submit Further Comments in the Federal Communications Commission ("FCC" or "Commission") Notice of Inquiry ("NOI") in which the FCC is examining whether rule changes in the 896-901/935-940 MHz band ("900 MHz Band") would "increase access to spectrum, improve spectrum efficiency, and expand flexibility…for next generation technologies and services."[4] The rules governing the 900 MHz Band have not been updated in any meaningful technical or operational sense for more than 30 years. The spectrum remains assigned in 12.5 kHz bandwidth increments, affording limited opportunity to aggregate channels for wideband operation. Outside the major urban areas, much of it has never been placed into operation. At issue is whether the 900 MHz Band presents a unique opportunity for the FCC to enable Private Enterprise ("PE"), including Critical Infrastructure Industry ("CII"), entities to

[4] Review of the Commission's Rules Governing the 896-901/935-940 MHz Band, WT Docket No. 17-200, *Notice of Inquiry*, 32 FCC Rcd 6421 at ¶ 1 (rel. Aug. 4, 2017) ("NOI").

deploy self-provisioned broadband networks on spectrum below 1 GHz, much of which already is allocated for their use.

I INTRODUCTION

"In judging whether to allow new service rules, the FCC has to balance the interests of incumbents, new entrants and the public."[5] The Commission has undertaken this balancing act on multiple occasions over many decades. When possible and with appropriate protection for incumbents, it has adopted rules that permit the introduction of technologies with the greater capabilities and functionalities needed to meet current and future operational needs, because doing so serves the public interest. EWA/PDV believe the FCC can achieve this balance in the 900 MHz Band. Not only does the record confirm that this spectrum can be realigned to include a broadband option without causing interference to incumbents within or outside the band, but many of the intended broadband users are 900 MHz Band incumbents.

This conviction prompted EWA/PDV to file the Petition for Rulemaking recommending creation of a Private Enterprise Broadband ("PEBB") license, an authorization that would be dedicated to addressing the requirements of PE/CII entities whose broadband needs are not met on consumer-oriented commercial networks.[6] The record developed in response to the Petition and in this proceeding demonstrates an increasing recognition from this user community that they have an urgent need for private, self-provisioned broadband capabilities, one that may be addressed in the 900 MHz Band and should not be delayed any longer.

[5] A Quick Introduction to Risk-Informed Interference Assessment: The Spectrum and Receiver Performance Working Group of the Federal Communications Commission's Technological Advisory Council, Version 1, April 1, 2015 at ii.
[6] Petition for Rulemaking of the Enterprise Wireless Alliance and Pacific DataVision, Inc., RM-11738 (filed Nov. 17, 2014) ("Petition").

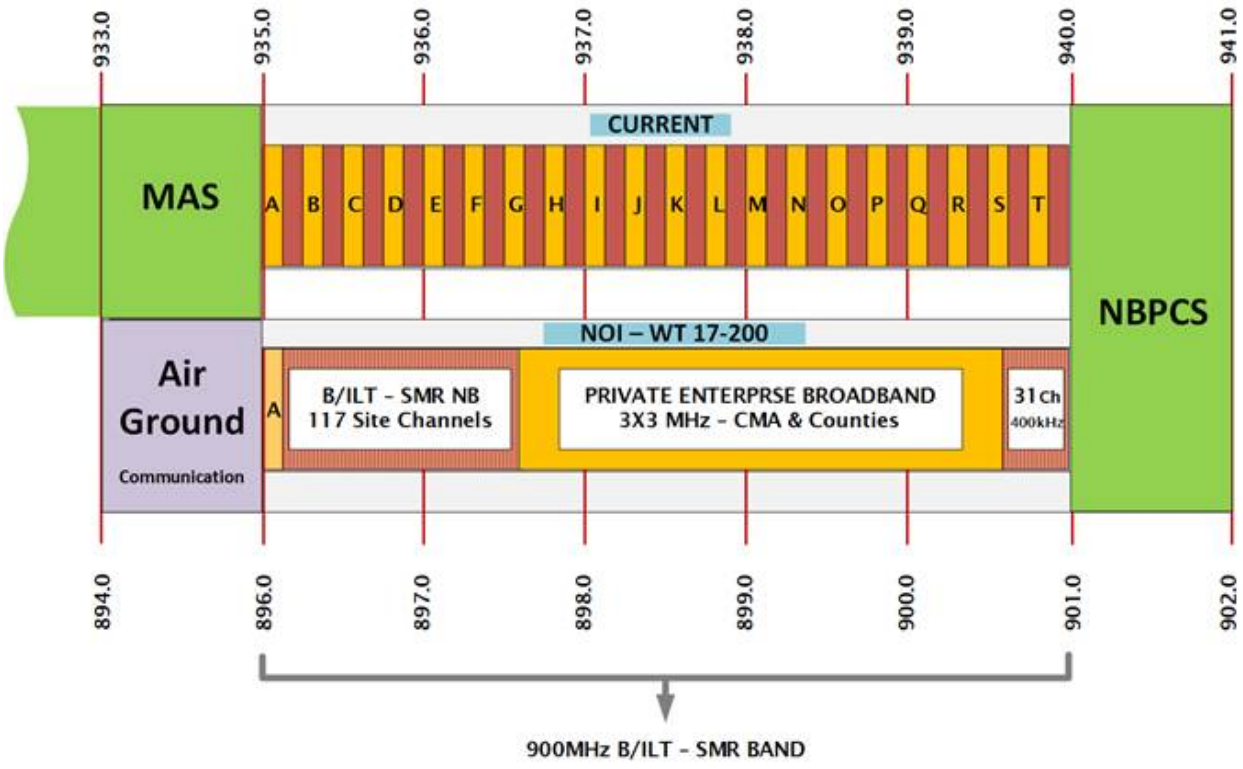
At the same time, EWA/PDV are fully aware of the vital role narrowband systems play in addressing PE/CII operating demands. They would not have proposed a band realignment without sound technical support confirming that the technologies could co-exist. The engineering analyses submitted by and on behalf of the EWA/PDV proposal have not been refuted.

Nonetheless, the concerns expressed by interested parties, have prompted EWA/PDV to revisit certain aspects of their proposal in an effort to move this proceeding forward expeditiously in light of these users' current, urgent need for private broadband networks.[7] The following key refinements, discussed more fully below, are intended to address operational, technical, and policy issues that have been raised:[8]

- Shift the PEBB allocation down 400 kHz to 897.600-900.600/936.600-939.600. This will move the broadband allocation away from adjacent 901/940 MHz Narrowband PCS ("NPCS") systems operated by customers of Sensus America, Inc. ("Sensus"). This shift also will create an upper and lower PLMR narrowband segment, thereby allowing greater separation between co-located frequencies in narrowband systems.

[7] EWA/PDV urge that this modified proposal be considered in the Notice of Proposed Rulemaking that will be the next step in this proceeding, thereby avoiding the further delay of seeking comment on the proposal as a separate matter.

[8] Proposed rules are attached as Attachment 1.



As discussed below, the shift of the PEBB spectrum is dependent upon accommodating the Association of American Railroads ("AAR") requirements by modifying its license, WPSF894, to channels lower in the 900 MHz Band. PDV is engaged in very constructive discussions with AAR on this subject and believes an accommodation will be reached.

- Adopt an asymmetrical emission mask by adjusting the uplink (897.600-900.600 MHz) mask to the standard limit of 43 + 10 log (P) dB while retaining the 50 + 10 log (P) dB mask for downlink (936.600-939.600 MHz) spectrum. A more stringent uplink mask had been proposed to address the Sensus concern about interference to adjacent NPCS operations. This will allow PE/CII broadband users to enjoy the full ecosystem of LTE Band Class 8 subscriber devices available today in the global market.[9]

- Issue geographic PEBB licenses based on Metropolitan Statistical Areas ("MSAs") in the top 306 Cellular Market Areas ("CMAs") and on individual counties in the remaining 428 CMAs. Unlike Major Trading Areas ("MTAs"), these smaller geographic licenses align more closely with the service areas of PE/CII entities.

[9] In October 2017, the Commission granted an Experimental Special Temporary Authorization to Loon, Inc., call sign WL9XWQ, "to support licensed mobile carriers' restoration of limited communications capability in areas of Puerto Rico." Service was provided using LTE Band Class 8 equipment operating on 900 MHz spectrum made available to Loon by PDV and other licensees.

- During the first year after adoption of PEBB licensing rules, allow PE/CII applicants exclusively the opportunity to secure PEBB licenses through the traditional frequency coordination process. Applicants would demonstrate to a Part 90 coordinator of their choice that they control 240 discrete 900 MHz channels in the desired MSA or county (channels for which they already are licensed, those they purchase/lease from third parties, and those they claim from FCC inventory) and secure the coordinator's certification to the FCC that the holdings qualify to be exchanged for the 3X3 MHz (240 channel) PEBB license.[10]

- After the one-year coordinated application period, in markets where no PE/CII entity has secured the PEBB license conduct overlay auctions for the geographic areas described above with the PEBB license awarded to the highest bidder, whether commercial or PE/CII applicant.

These proposed revisions are responsive to the legitimate issues raised in response to the PEBB proposal. EWA/PDV submit that they lay the groundwork for a comprehensive Notice of Proposed Rulemaking and, subsequently, a Commission decision to modernize the 900 MHz Band to include broadband opportunities.

II THE FCC SHOULD CHART A PATH TO SELF-PROVISIONED PE/CII BROADBAND

This Commission, led by Chairman Pai, has transformed the FCC into an agent for change. It has championed numerous initiatives designed not only to permit but to promote the introduction of advanced technologies and services intended to benefit the American consumer. Recently, it became the first Commission to propose rules that would implement the 1983 Congressional directive in Section 7 of the Communications Act to respond within one year to applications proposing new technologies or services. That this long overdue step is considered bold simply highlights the fact that all intervening FCCs failed to embrace this legislative mandate.

[10] Because applicants will need to include spectrum acquired from other licensees, a variety of commercial arrangements might be used such as joint ventures, limited partnerships and others.

Indeed, in the time since the Petition was filed, and in particular since January 2017, the FCC has been unstinting in its effort to free up spectrum for commercial broadband use.[11] It has shown laser focus in ensuring that the United States will have the right spectrum at the right time to lead the world in 5G development. EWA/PDV support these consumer-focused Commission activities. They are pleased to see Chairman Pai announce that "we will help ensure that the FCC is an ally to entrepreneurs in the years to come."[12] The Commission clearly needs no education or persuasion when it comes to recognizing the importance of broadband to the future of the nation. That critical importance is at least as essential to PE/CII users as it is to consumers, and EWA/PDV urge the FCC to adopt a similarly proactive, supportive role in responding to the advanced wireless requirements of America's businesses.

All businesses need access to its capabilities and some entities need self-provisioned facilities because of the criticality of their operations. Companies including UPS, Ameren, Ericsson, Eversource Energy, Martin Marietta, General Dynamics, and Western Farmers, as well as organizations such as the American Petroleum Institute ("API") all have endorsed the 900 MHz PEBB concept.

Moreover, as detailed below, the timing of addressing these specialized broadband requirements becomes more urgent each day. A coalition of representatives of the utility and business communities, including the Edison Electric Institute and the Utilities Telecom Council, in addressing the importance of access to 3.5 GHz broadband spectrum explained the following:

> With particular regard to the electric industry, it was pointed out that the industry is investing approximately $100 billion per year on building new infrastructure.

[11] *See, e.g.*, WP Docket No. 07-100; GN Docket Nos. 14-177, 17-183 and 17-258.
[12] Encouraging the Provision of New Technologies and Services to the Public, GN Docket No. 18-22, *Notice of Proposed Rulemaking*, FCC 18-18 Statement of Chairman Ajit Pai (rel. Feb. 23, 2018).

> Much of this investment is targeted at deployment of the Smart Grid/Energy IoT. Not only will this help improve grid safety, reliability and security, it will also facilitate the offering of new services related to Smart Communities, microgrids, electric vehicles and a host of other new consumer services. The current spectrum that electric utilities have is not sufficient to meet the growing capacity requirements of the Smart Grid/Energy IoT.[13]

The President and CEO of the Utilities Technology Council, was quoted recently as saying that Congress needs to send "a strong signal to government agencies about how critical spectrum is to our nation's electricity future."[14] These organizations, of course, are correct. Utilities are at the forefront of PE users whose broadband needs are so imminent and so critical that they cannot be deferred. But they are not alone, as evidenced by the participants in the coalition filing. Major American companies face broadband challenges in conducting their manufacturing, aviation, petroleum, and other activities. These industries, like America itself, need to lead the way in securing the benefits of broadband that can only result from having access to dedicated spectrum. EWA/PDV urge the Commission to adopt an NPRM consistent with the recommendation in these Further Comments as promptly as possible as an essential broadband pathway for PE/CII entities.

The urgency of providing an opportunity for PE/CII entities to deploy self-provisioned LTE systems on spectrum below 1 GHz has grown exponentially more compelling in the years since the Petition was filed. These PE entities, and most particularly the CII utilities responsible for delivering power to the American people, to businesses, and to the government itself over an electric grid that must continue to grow smarter, face an increasingly time-sensitive need for broadband capabilities. As explained by the Critical Infrastructure Coalition ("CIC"):

[13] GN Docket No. 17-258, Mar. 13, 2018 Edison Electric Institute *Ex Parte* Presentation. EWA/PDV address below the complementary nature of their 900 MHz broadband proposal and the broadband opportunities at 3.5 GHz at issue in this pleading.

[14] Electricity Industry on a Collision Course with the FCC, Washington Examiner, April 17, 2018.

Utilities and other critical infrastructure industry ("CII") users urgently need access to broadband spectrum below one GHz to develop their own private network systems based on LTE technology.[15]

The Department of Energy addressed this issue candidly and with succinct urgency in 2015, making the following observations:

> The development of new technologies and investments in new infrastructure to modernize the electric power grid is largely a private-sector responsibility.
>
> The current business-as-usual trajectory for the electricity industry will not result in a timely transition to a modernized grid. We are already 15 years into the new century and large investments decided on today may not fully come on line for ten years or more.
>
> Innovation in the electric power sector is inhibited by an unclear investment environment, due to regulatory, market, and business model uncertainties. [16]

The FCC can help clarify this environment by taking action promptly to clear a path for a CII broadband option in the 900 MHz Band.

The Commission already has undertaken extensive vetting of the 900 MHz broadband concept. It has received comments on the Petition itself,[17] on the proposed rules submitted by EWA/PDV,[18] and on band realignment as one option in this FCC Notice of Inquiry into the rules governing the 900 MHz band.[19] It is time to adopt a Notice of Proposed Rulemaking consistent with the recommendations herein.

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[15] WT Docket No. 17-200, CIC Comments at 12 (emphasis added).
[16] U.S. Department of Energy, Grid Modernization Multi-Year Program Plan (Nov. 2015) at 6-7.
[17] *See* Wireless Telecommunications Bureau Seeks Comment on Enterprise Wireless Alliance and Pacific DataVision, Inc. Petition for Rulemaking Regarding Realignment of 900 MHz Spectrum, RM-11738, *Public Notice* DA 14-1723 (Nov. 26, 2014).
[18] *See* Wireless Telecommunications Bureau Seeks Comment on Supplement to Enterprise Wireless Alliance and Pacific DataVision, Inc. Petition for Rulemaking Regarding Realignment of 900 MHz Spectrum, RM-11738, *Public Notice*, DA 15-579 (May 13, 2015).
[19] *See* NOI.

III THE SMART GRID AND OTHER 21st CENTURY PE/CII OPERATIONAL REQUIREMENTS COMPEL A 900 MHz BAND REALIGNMENT

A. The Modernized Utility Grid Requires Broadband Communications Networks Balanced with Security Protections

1) Broadband is a Fundamental Ingredient in Building a Modern Smart Grid

Fifteen years ago, DOE envisioned the future modernized grid as:

> a fully automated power delivery network that monitors and controls every customer and node, ensuring a two-way flow of electricity and information between the power plant and the appliance, and all points in between [enabled by] distributed intelligence, coupled with broadband communications and automated control systems.[20]

According to the Congressional Research Service ("CRS"), "Internet-linked communications systems may be important to today's interconnected grid, but the Internet also provides a ready path to cyberattack from any corner of the world wide web."[21] CRS also notes, however, that "security concerns and data usage requirements may move the system to dedicated communications and information channels serving uniquely Smart Grid uses."[22] Self-provisioned 900 MHz broadband networks are optimally positioned to bridge this tension between the unquestioned need for and risk of CII broadband utilization.

As the power grid becomes increasingly modernized, with the growing reliance on broadband data communications that accompanies the rapidly rising number and distribution of data-generating end-points, the networks that carry that data become more enticing targets for

[20] United States Department of Energy, Office of Electric Transmission and Distribution, "Grid 2030" - A National, Vision for Electricity's Second 100 Years (July 2003) at 17.
[21] Congressional Research Service, Report R41886, The Smart Grid and Cybersecurity - Regulatory Policy and Issues, (June 15, 2011) at 10; Electric Power Research Institute Report to NIST on the Smart Grid Interoperability Standards Roadmap (Contract No. SB1341-09-CN-0031 - Deliverable 10) (Aug. 10, 2009) at 41 ("Interconnected networks can introduce common vulnerabilities.").
[22] *Id.* at 7-8.

cyberattack. In 2015, DOE described the risk associated with data networks supporting the modernized grid:

> Over time, cyber/IT dependencies have increased dramatically. … Energy control systems and the information and communications technologies on which they rely play a key role in the North American energy infrastructure. These cyber/IT components are essential in monitoring and controlling the production and distribution of energy. … [H]owever, the reliance of energy infrastructure on cyber infrastructure can also present vulnerability.[23]

The National Institute of Standards and Technology ("NIST") also recognizes the risk to the modernized grid posed by its dependence on broadband communications, stressing the importance of "securing the computing and communication networks that will be central to the performance and availability of the envisioned electric power infrastructure."[24] NIST specifically highlighted its concern that the grid's "[i]ncreasing vulnerabilities to communication disruptions and the introduction of malicious software/firmware or compromised hardware could result in denial of service (DoS) or other malicious attacks."[25]

Last year, the Federal Energy Regulatory Commission ("FERC") took action, directing the development of standards for FERC approval "to address . . . the need for mandatory protection for communication links and data communicated between bulk electric system Control Centers in a manner that reflects the risks posed to bulk electric system reliability."[26]

[23] DOE 2015 Energy Sector-Specific Plan (2015) at 20.
[24] National Institute of Standards and Technology, The Smart Grid Interoperability Panel - Smart Grid Cybersecurity Committee, NISTIR 7628 Revision 1, Guidelines for Smart Grid Cybersecurity Volume 1 - Smart Grid Cybersecurity Strategy, Architecture, and High-Level Requirements (September 2014) at ix.
[25] *Id.* at 1.
[26] Revised Critical Infrastructure Protection Reliability Standards, Order 822, Docket No. RM 15-14-00, 154 F.E.R.C. ¶ 61,037, ¶ 18 (2016).

2) Private CII Networks on Dedicated Spectrum Reduce Cybersecurity Risks

Recognizing that they must have broadband capabilities, but also fully aware that consumer-based commercial networks carry substantially heightened security risks as well as operational and coverage limitations, CII entities have turned to private networks for such "dedicated communications and information channels." In a 2014 letter, eight national associations representing gas, electric, and water utilities and petroleum companies explained:

> The reason that utilities and CII operate their own extensive private internal communications systems is to protect the safety of utility and CII personnel, as well as the overall operational safety of utility and CII generation, transmission and distribution infrastructure. … Not only do these communications systems protect the safety of utility and CII personnel, but they also protect public safety more generally by ensuring the safe, effective and secure delivery of essential electric, gas and water services as well as petroleum services to the public at large.[27]

Specifically speaking to the need for secure, reliable private wireless networks to support CII, the eight associations stated that "utilities and critical infrastructure industries (CII) need access to radio frequency spectrum for their private internal communications networks that support the safe, reliable and secure delivery of essential electric, gas and water services to the public."[28] The National Association of Regulatory Utility Commissioners ("NARUC") supported the associations' request, stating the following in a 2014 resolution:

> Utilities and other CII rely on their own extensive private communications networks to support the safe, reliable and secure delivery of these essential electric, gas, water and oil services; and … use these private internal communications systems for … mission critical systems that are necessary to ensure the operational

[27] Letter from American Gas Association, American Public Power Association, American Petroleum Institute, American Water Works Association, Edison Electric Institute, National Association of Water Companies, National Rural Electric Cooperative Association, and Utilities Telecom Council to Colette D. Honorable, Chairman of the Board and President, National Association of Regulatory Utilities Commissioners, Chris Nelson, Chair, NARUC Committee on Telecommunications, and Barry T. Smitherman, Chair, NARUC Committee on Gas, regarding "TC-1 Resolution on Utilities Access to Spectrum to Promote Public Safety," (Nov. 13, 2014) at 3.
[28] *Id.* at 1.

> safety, reliability and security of electric, gas, water and oil transmission and distribution infrastructure.[29]

3) Realigning the 900 MHz Band to Support CII-Designed and Dedicated Broadband Networks Aligns with the Long-Standing National Policy Supporting Cyber-Secure Communications Systems for the Power Grid and Is Urgently Needed

Thirteen years ago, Congress recognized the threat of cyberattack to the power grid, specifically building protection against a "cybersecurity incident" into its definition of "reliable operation" of the bulk-power system.[30] In 2007, Congress raised cybersecurity of the modernized grid to the level of national policy:

> It is the policy of the United States to support the modernization of the Nation's electricity transmission and distribution system to maintain a reliable and secure electricity infrastructure that can meet future demand growth and to achieve . . . [d]ynamic optimization of grid operations and resources, with full cyber-security.[31]

That legislation is now over a decade old. It is no longer a description of deliberate, responsible policy setting the stage for study, due consideration, and eventual action; as attacks mount, it has become an alarm calling for prompt implementation of cyber protections.

Last year, 10 years after Congress established the national policy, the President made it "the policy of the executive branch to use its authorities and capabilities to support the cybersecurity risk management efforts of the owners and operators of the Nation's critical infrastructure."[32] The time is <u>now</u> for the Commission to support the cybersecurity risk management efforts of CII operators by proposing a modernized 900 MHz Band to enable the

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[29] NARUC Resolution on Utilities' Access to Spectrum to Promote Public Safety (Nov. 19, 2014).
[30] 16 U.S. C. §824o(a)(4) (2005) ("The term 'reliable operation' means operating the elements of the bulk-power system within equipment and electric system thermal, voltage, and stability limits so that instability, uncontrolled separation, or cascading failures of such system will not occur as a result of a sudden disturbance, including a cybersecurity incident, or unanticipated failure of system elements.").
[31] 42 U.S.C. §17381 (2007).
[32] Presidential Executive Order on Strengthening the Cybersecurity of Federal Networks and Critical Infrastructure, Exec. Order No. 13800, 82 Fed. Reg. 22391, (May 16, 2017).

modernized grid, a band in which CII entities already have primary spectrum rights, and that is capable of addressing urgent broadband as well as traditional narrowband CII needs.

B. Other Major US Businesses Also Require Self-Provisioned Broadband

American businesses in addition to utilities have broadband requirements that are not addressed by traditional commercial carriers. For example, United Parcel Service ("UPS") stated the following:

> The entrance of a 900 MHz PEBB licensee will provide a much-needed enterprise-grade provider in the marketplace for commercial LTE services, where current providers are understandably more focused on the typical consumer's needs. UPS is a heavy user of commercial LTE services throughout many parts of our business, but for mission-critical communications at many of our larger facilities, no existing LTE service provider to date has been willing or able to guarantee contractually the service levels we require.[33]

API, representing more than 600 companies involved in all aspects of the petroleum and natural gas industries, offered a compelling explanation of why this essential industry needs a PE/CII-focused broadband option:

> Like most other industries, the oil and natural gas industry is experiencing the IoT revolution…API recognizes that high performing push-to-talk services delivered over IP/LTE platforms is now a technical reality. The appropriateness of moving that direction in a particular application is more a question of assuring RF coverage and having control over the management and restoration aspects of the network, which is commensurate with the criticality of the activity the system supports.[34]

> It is against this background that the concept of a [PEBB] service offering begins to make sense. The PEBB concept provides not only a potential spectrum option, but also addresses other issues presented by attempting to shoehorn critical systems onto carrier networks that were developed for, and still focused on, consumer markets. For example, the oil and natural gas industry expects to deploy many thousands of IoT devices. In the consumer markets updates to end user devices occur frequently and are accomplished by pushed software updates. This is an unacceptable paradigm for the oil and natural gas industry. Network components are expected to operate at remote locations for many years and upgrades are verified

[33] WT Docket No. 17-200, UPS Comments at 4.
[34] WT Docket No. 17-200, API Comments at 3-4.

> by trained personnel to ensure proper operations and to avoid catastrophic failures.[35]

Other parties have endorsed this need for a specialized industrial-oriented broadband offering and suggested a variety of use cases. Ericsson, which has a pre-eminent role in both the LTE and industrial worlds, made the following observation: "…LTE will address the improved communications necessary to make many industrial IoT use cases viable and it can provide the necessary levels of security that critical infrastructure entities need."[36] Council Rock confirmed the need for an industrial broadband option:

> While broadband LTE technology has become a universally accepted standard in the commercial marketplace, there has been limited opportunity for critical infrastructure entities to enjoy its functionality and economies of scale except as a customer on a commercial network. That option is fine for certain applications, but, as these companies have explained to the FCC, they often have coverage, reliability, security, priority access and other requirements that are not met on today's commercial systems. A private carrier broadband network in a band below 1 GHz where infrastructure costs are manageable would offer these entities a business-targeted option that is sorely needed.[37]

For Martin Marietta, a lack of coverage to and from remote quarry sites, as well as a lack of priority access, have caused it to support a business-focused broadband network that can be designed to its specific requirements. Even smaller companies such as Victory Propane have identified particular use cases, for that company remote tank reading, for which it has found consumer-focused commercial broadband services insufficiently reliable.

Even more recently, a coalition of associations and individual entities, including EWA and PDV, laid out in stark terms the critical importance of self-provisioned broadband for IIoT applications and their intrinsic relationship to national security concerns:

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[35] *Id*. at 4-5.
[36] WT Docket No. 17-200, Ericsson Comments at 4.
[37] WT Docket No. 17-200, Council Rock *ex parte* letter.

> The IIoT Coalition believes that industrial and critical-infrastructure operators are best positioned to evaluate their operational security needs and the necessary response to the growing threat of cyber intrusions by foreign and domestic hackers. Industrial and critical-infrastructure entities will be able to design and deploy IIoT networks that will ensure the safety, security, resilience, and, where applicable, compliance with North American Electric Reliability standards at their essential facilities. If the Commission instead adopts a CBRS licensing framework that lacks reasonable small geographic-area licensing, such action would deny industrial and critical infrastructure entities meaningful access to the 3.5 GHz band and could undermine U.S. national and homeland security by denying them the ability to deploy IIoT applications and services that improve the resiliency of their operations.[38]

The 3.5 GHz band at issue in that filing will fill a vital role in addressing fixed, localized IIoT needs where expansive capacity is required, but it cannot provide the propagation and mobility advantages offered by the 900 MHz PEBB option. Together, these bands can play essential, complementary roles in addressing PE/CII broadband requirements.

The record in this and other FCC proceedings already supports the demand for PE/CII broadband spectrum. The modifications proposed in these Further Comments, in particular the opportunity for these entities to coordinate and hold their own broadband licenses in geographic areas well-suited to their needs, will make the PEBB option even more appealing.

IV RELOCATING THE PEBB LICENSE WOULD BE RESPONSIVE TO BOTH PLMR AND NPCS ISSUES, BUT ANY CHANGE MUST ALSO ACCOMMODATE AAR REQUIREMENTS

A. The Advantages of Shifting the PEBB License Down in the 900 MHz Band

EWA/PDV remain confident that the PEBB license could remain at 898-901/937-940 MHz without adversely impacting the operations of 900 MHz PLMR narrowband licenses below that band segment or NPCS systems operating immediately above it at 901/940 MHz. As explained in

[38] GN Docket No. 17-258, IIoT Coalition April 19, 2018 *ex parte* letter at 1.

the analyses submitted by Pericle Communications Company ("Pericle"), DVA Consulting, LLC ("DVA"), and Ericsson, as well as those included in previous EWA/PDV filings, the potential for interference is *de minimis* even under worst case conditions. The stringent emission mask proposed for this license is capable of providing appropriate levels of protection to systems operating on adjacent spectrum.

Nevertheless, there could be advantages to shifting the PEBB license down 400 kHz to 897.600-900.600/936.600-939.600 MHz. First, it would allow for narrowband operations above and below the broadband allocation, providing the possibility of greater separation between frequencies in narrowband systems. While the record confirms that modern ceramic cavity filter combiner technology allows systems to use frequencies spaced as close as 250 kHz and even 150 kHz without discernible losses in power,[39] and the licenses of many incumbent systems already show even closer-spaced frequencies at individual sites, a separation between narrowband segments would allow greater flexibility in frequency selection for incumbents that choose to continue operating in narrowband mode.

Additionally, moving the PEBB license even 400 kHz from the band edge with the NPCS allocation at 901/940 MHz would be consistent with the protection Sensus USA, Inc. ("Sensus") has sought for its Advanced Metering Infrastructure ("AMI") systems used by electric and water utilities. Sensus has explained that these systems have been designed to tolerate no receive signal levels above the thermal noise floor from adjacent systems.

The record confirms that an immediately adjacent PEBB system would cause less potential interference to these AMI operations than would the narrowband PLMR systems already

[39] WT Docket No. 17-200 Comments of EWA/PDV: Attachment 1 - Altaris Technology Partners Report at 3; Attachment 2 - DVA Report at 8.

authorized to operate in immediate proximity to NPCS.[40] Nonetheless, if it is possible to shift the PEBB license down, the FCC would have resolved the Sensus issue. Doing so would have the additional benefit of allowing adoption of an asynchronous emission mask for the PEBB system. Downlink operations in the 936.600-939.600 MHz band would remain subject to the highly protective 50 + 10 log (P) dB emission limit, thereby providing the necessary protection for adjacent PLMR systems, while the uplink operations of concern to Sensus would now be in the 897.600-900.600 MHz band and could be modified to the more standard emission limit of 43 + 10 log (P) dB. This would open to the PEBB broadband community the full ecosystem of Band Class 8 devices available internationally with the attendant cost savings and feature sets that flow from a robust consumer-based marketplace.

B. AAR's ATCS Operations Must be Accommodated in the Band Plan

AAR occupies a unique position in the 900 MHz Band. It has been assigned six non-contiguous channels, effectively nationwide, for Advanced Train Control System ("ATCS") operations.[41] The highest ATCS channel is immediately below 937 MHz, the current proposed lower band edge of the PEBB license, which was a decisive factor in the original positioning of the PEBB Service. This dedicated use extends into Canada since certain U.S. and Canadian freight rail lines operate ATCS cross-border. Section 3.2.3 of Arrangement U, the 2013 900 MHz Band Sharing Agreement between the U.S. and Canada, specifies that those channels will be used for ATCS in the sharing zones along the border unless a different agreement is reached between the signatory agencies.

AAR and its members, like all businesses that rely heavily on wireless communications to conduct their operations reliably and efficiently, are considering how best to address their future

[40] WT Docket No. 17-200, Pericle Comments at 4.
[41] See AAR call sign WPFS894.

requirements, including the next generation of ATCS. AAR's Comments and Reply Comments in this proceeding urged the FCC to create wideband channels of 50-500 kHz bandwidth to accommodate the railroads' growing needs. AAR has recognized that the technology choices for non-contiguous 12.5 kHz channels are limited in an increasingly broadband world, a situation not likely to change in the future. The increasingly complex communications requirements railroads face will be exceedingly difficult to address with their current 900 MHz spectrum position. Migrating to a next generation ATCS technology platform will require greater bandwidth than is available currently to AAR in the 900 MHz Band.

For these reasons, PDV and AAR are in discussion about a potential exchange of AAR's six non-contiguous channels for a larger amount of contiguous PDV spectrum. Much progress has been made and the parties will remain in regular communications about the remaining issues, working toward a definitive agreement. PDV believes that a spectrum exchange between AAR and PDV would constitute that elusive win-win-win situation. A block of contiguous channels would provide AAR with greater flexibility and superior technology options for the modernized 21st century ATCS network needed by one of American's most essential CII entities for critical safety communications. The two 900 MHz Band incumbents holding channels for nationwide footprints are working collaboratively to craft a solution that will provide greater flexibility in realigning the 900 MHz band, while also delivering the advantages for 900 MHz PLMR and NPCS users described above.

V PART 90 FREQUENCY COORDINATION AND OVERLAY AUCTIONS ARE WELL-TESTED AND FAMILIAR TO BOTH PLMR USERS AND THE COMMISSION

A. The PEBB Geographic Areas

One consistent objection to spectrum auctions by certain PE/CII entities, in particular utilities, is the geographic size of the market areas. They argue auctioned licenses too frequently appear designed to accommodate commercial wireless carriers that want to maximize the geography in a single authorization, and do not conform to and typically are much larger than the service areas of non-commercial entities.[42]

Under the earlier 900 MHz broadband proposal, PEBB licenses would be issued for MTAs, since the authorizations were to be awarded to the predominant MTA licensee in each area. This connection has been eliminated in the new process recommended above, allowing EWA/PDV to recommend much smaller market areas both for coordinated and auctioned PEBB licenses. Rather than MTAs, they recommend that the licenses be available in the 306 Metropolitan Statistical Areas ("MSAs") used to define cellular markets in more urbanized areas, and on a county-by-county basis outside the MSAs.

There likely is no defined geographic area that matches perfectly any individual PE/CII service area, much less the service areas of the multiplicity of entities that might want to hold a 900 MHz broadband authorization. Multi-county MSAs represent a reasonable size for mobile broadband operations in urbanized areas, while single counties will create opportunities for smaller enterprises in more rural markets. Because geographic licenses can be grouped to create larger areas or subdivided through geographic partitioning to more closely align with smaller service

[42] *See* n. 35 *supra*.

areas, licensees will have the opportunity to tailor their authorizations to their specific requirements. This should prove workable when PE/CII licenses are dealing with like entities, all of which want coverage over the area in which they actually operate, no more and no less.

EWA/PDV recognize that certain CII users strongly support census tract licensing for the 3.5 GHz Citizens Broadband Radio Service ("CBRS").[43] Both EWA and PDV have endorsed that position as well. The entirely fixed use cases in that higher band are distinct from the mobile and fixed operations that will be conducted in the 900 MHz band with its superior propagation. In fact, as noted above, EWA/PDV view CBRS as complementary to PEBB licensing. It will provide additional broadband capacity in discrete areas such as campuses, convention centers, refineries, manufacturing plants and other venues of very limited coverage with no mobile requirement.

B. PEBB License Award Process

Utilities as well as other PE/CII entities have consistently proclaimed their desire for spectrum below 1 GHz on which they can deploy self-provisioned broadband facilities.[44] For example:

> Third party broadband service providers cannot provide the required network services for the exclusive use by the utilities and other CII users, nor can they provide the consistent network availability and reliability that is critical in all cases and imperative in emergency situations…Utilities will have little interest in CMRS services that do not provide the necessary levels of control, availability, and reliability required for restoration communications systems.[45]
>
> …Duke Energy is strongly in favor of the Commission granting additional sub-one GHz spectrum to electric utilities to build private broadband LTE networks to use for their ever-expanding broadband needs resulting from grid modernization.[46]

---

[43] *Id*.
[44] The Petition proposed that these types of entities would enter into lease agreements with the PEBB licensee, presumably long-term *de facto* control leases, and that they would define the broadband facilities to be deployed with the right to operate and manage them.
[45] WT Docket No. 17-200 Comments of NextEra Energy, Inc.
[46] WT Docket No. 17-200 Comments of Duke Energy Corporation.

While a greenfield allocation would be favored by those parties, the 900 MHz band is the only spectrum already assigned for their use in which a viable pathway to mobile and fixed broadband capability has been identified.

Some PE/CII entities disagreed with the original PEBB concept whereby the license would be awarded to the major holder of already auctioned, geographic MTA licenses in an area, in most cases PDV. In particular, they objected to this approach because of their concern about relying on a third-party carrier to provide the level of service they require. EWA/PDV maintain that the build-to-suit approach proposed in the Petition would have enabled companies, even CII entities, to design and operate the broadband systems they need, but they are sensitive to their responsibilities to the public that drive the desire for network control. They have reconsidered this aspect of the proposal and believe that the well-established Part 90 frequency coordination process could play a valuable role in allowing parties without MTA licenses to secure PEBB spectrum rights.

A number of the 900 MHz incumbents that have expressed the greatest concern about this issue already control a significant number of narrowband channels in their operating area. EWA/PDV recommend that for a one-year period, PE/CII entities – and no commercial applicants – be permitted to demonstrate to a frequency coordinator of their choice that they have the right through ownership, by contract, or by default (as described below) to 240 discrete narrowband channels, the amount of spectrum needed for 3X3 MHz broadband capability. These channels can be ones they already own and ones they purchase or lease in the secondary market. They also can claim by default any unassigned channels held by the FCC in the market.[47] Once the frequency

[47] These channels almost exclusively are allocated for use by business and industrial entities, not commercial applicants. Most have remained unused for several decades. This proposal would allow already eligible PE/CII entities to use this spectrum for broadband applications.

coordinator has confirmed the sufficiency of the applicant's channel holdings in the identified market, including verifying the availability of claimed FCC channels, it would certify the application to the Commission and the discrete channels would be exchanged for the 3X3 PEBB license. The current frequency coordination process has established protocols for the exchange of information between coordinators to prevent mutually exclusive applications from being filed with the FCC. Those same protocols would apply to PEBB applications.

As proposed in the Petition, and consistent with other bands that have undergone repurposing, the PEBB licensee would be responsible for providing comparable facilities to any remaining incumbents in the 3X3 MHz segment. This could be done by relocating them to discrete channels relinquished by the PEBB licensee in the exchange process, which should be reserved for a reasonable amount of time to facilitate relocation.

At the end of a year, the Commission would conduct overlay auctions for any PEBB licenses that have not been claimed by a PE/CII applicant. The FCC presumably would use the Simultaneous Multiple Auction Round process that has been used successfully in similar overlay auctions of Part 90 spectrum, including the 900 MHz MTA licenses that were purchased through competitive bidding more than 20 years ago.[48] Commercial applicants as well as PE/CII entities could participate in the auction, and the winning bidder would be subject to the comparable facilities standard for relocating incumbent licensees within the PEBB Service spectrum.

[48] Auction 7, 900 MHz Specialized Mobile Radio Service, completed Apr. 15, 1996.

VI CONCLUSION

This Commission has made a commitment to considering proposals and conducting proceedings with all reasonable speed. A realignment of the 900 MHz Band is more than ripe for consideration in a Notice of Proposed Rulemaking. In the time that the proposal has been before the FCC, the concept of a private broadband option, distinct from the offerings of consumer-oriented systems, has gained the support of multiple parties. Previous opponents, such as API and Eversource, now agree that there is an urgent need for such an option in a band where mobile and fixed coverage can be achieved cost-effectively. While EWA/PDV will continue to work with all affected parties in an effort to resolve any remaining differences through compromise and collaboration, they respectfully urge the Commission to adopt a Notice of Proposed Rulemaking consistent with the recommendations herein at the earliest possible opportunity.

Realignment of the 896-901/935-940 MHz Band
To Create a Private Enterprise Broadband Service

PROPOSED RULES

PART 1 – PRACTICE AND PROCEDURE

1. The authority citation for part 1 is proposed to continue to read:

Authority: 47 U.S.C. 151, 154(i), 155, 157, 160, 201, 225, 227, 303, 309, 332, 1403, 1404, 1451, 1452, and 1455, unless otherwise noted.

2. Section 1.907 is proposed to be amended by modifying the definition of "Covered Geographic Licenses" as follows:

§1.907 Definitions.

* * * * *

Covered Geographic Licenses. Covered geographic licenses consist of the following services: 1.4 GHz Service (part 27, subpart I of this chapter); 1.6 GHz Service (part 27, subpart J); 24 GHz Service and Digital Electronic Message Services (part 101, subpart G); 218-219 MHz Service (part 95, subpart F); 220-222 MHz Service, excluding public safety licenses (part 90, subpart T); 600 MHz Service (part 27, subpart N); 700 MHz Commercial Services (part 27, subparts F and H); 700 MHz Guard Band Service (part 27, subpart G); 800 MHz Specialized Mobile Radio Service (part 90, subpart S); 900 MHz Specialized Mobile Radio Service (part 90, subpart S); Private Enterprise Broadband Services (Part 90, subpart AA); Advanced Wireless Services (part 27, subparts K and L); Air-Ground Radiotelephone Service (Commercial Aviation) (part 22, subpart G); Broadband Personal Communications Service (part 24, subpart E); Broadband Radio Service (part 27, subpart M); Cellular Radiotelephone Service (part 22, subpart H); Dedicated Short Range Communications Service, excluding public safety licenses (part 90, subpart M); H Block Service (part 27, subpart K); Local Multipoint Distribution Service (part 101, subpart L); Multichannel Video Distribution and Data Service (part 101, subpart P); Multilateration Location and Monitoring Service (part 90, subpart M); Multiple Address Systems (EAs) (part 101, subpart O); Narrowband Personal Communications Service (part 24, subpart D); Paging and Radiotelephone Service (part 22, subpart E; part 90, subpart P); VHF Public Coast Stations, including Automated Maritime Telecommunications Systems (part 80, subpart J); Upper Microwave Flexible Use Service (part 30); and Wireless Communications Service (part 27, subpart D).

* * * * *

3. Section 1.929 is proposed to be amended by modifying paragraphs (c)(2) and (c)(3) as follows:

§1.929 Classification of filings as major or minor.

* * * * *

(c) * * *

(2) In the 900 MHz SMR, 900 MHz Private Enterprise Broadband and 220 MHz Service, any change that would increase or expand the applicant's service area as defined in the rule parts governing the particular radio service.

(3) In the Paging and Radiotelephone Service, Rural Radiotelephone Service, Offshore Radiotelephone Service, Specialized Mobile Radio Service, and Private Enterprise Broadband Service:

* * * * *

4. Section 1.1307 is proposed to be amended by modifying paragraphs (b)(1) and (b)(2)(i) and Table 1 as follows:

§1.1307 Actions that may have a significant environmental effect, for which Environmental Assessments (EAs) must be prepared.

* * * * *

(b) * * *

(1) The appropriate exposure limits in §§1.1310 and 2.1093 of this chapter are generally applicable to all facilities, operations and transmitters regulated by the Commission. However, a determination of compliance with the exposure limits in §1.1310 or §2.1093 of this chapter (routine environmental evaluation), and preparation of an EA if the limits are exceeded, is necessary only for facilities, operations and transmitters that fall into the categories listed in table 1, or those specified in paragraph (b)(2) of this section. All other facilities, operations and transmitters are categorically excluded from making such studies or preparing an EA, except as indicated in paragraphs (c) and (d) of this section. For purposes of table 1, building-mounted antennas means antennas mounted in or on a building structure that is occupied as a workplace or residence. The term power in column 2 of table 1 refers to total operating power of the transmitting operation in question in terms of effective radiated power (ERP), equivalent isotropically radiated power (EIRP), or peak envelope power (PEP), as defined in §2.1 of this chapter. For the case of the Cellular Radiotelephone Service, subpart H of part 22 of this chapter; the Personal Communications Service, part 24 of this chapter, the Specialized Mobile Radio Service, part 90 of this chapter, and the Private Enterprise Broadband Service, part 90 of this chapter, the phrase total power of all channels in column 2 of table 1 means the sum of the ERP or EIRP of all co-located simultaneously operating transmitters owned and operated by a single licensee. When applying the criteria of table 1, radiation in all directions should be considered. For the case of transmitting facilities using sectorized transmitting antennas, applicants and licensees should apply the criteria to all transmitting channels in a given sector, noting that for a highly directional antenna there is relatively little contribution to ERP or EIRP summation for other directions.

Table 1—Transmitters, Facilities and Operations Subject to Routine Environmental Evaluation

Service (title 47 CFR rule part)	Evaluation required if:
* * *	* * *
Private Land Mobile Radio Services Private Enterprise Broadband (subpart AA of part 90)	Non-building-mounted antennas: height above ground level to lowest point of antenna <10 m and total power of all channels >1000 W ERP (1640 W EIRP).
	Building-mounted antennas: Total power of all channels >1000 W ERP (1640 W EIRP).
* * *	* * *

(2)(i) Mobile and portable transmitting devices that operate in the Commercial Mobile Radio Services pursuant to part 20 of this chapter; the Cellular Radiotelephone Service pursuant to part 22 of this chapter; the Personal Communications Services (PCS) pursuant to part 24 of this chapter; the Satellite Communications Services pursuant to part 25 of this chapter; the Miscellaneous Wireless Communications Services pursuant to part 27 of this chapter; the Upper Microwave Flexible User Service pursuant to part 30 of this chapter; the Maritime Services (ship earth stations only) pursuant to part 80 of this chapter; the Specialized Mobile Radio Service, the Private Enterprise Broadband Service, the 4.9 GHz Band Service, and the 3650 MHz Wireless Broadband Service pursuant to part 90 of this chapter; the Wireless Medical Telemetry Service (WMTS), the Medical Device Radiocommunication Service (MedRadio), and the 76-81 GHz Band Radar Service pursuant to part 95 of this chapter; and the Citizens Broadband Radio Service pursuant to part 96 of this chapter are subject to routine environmental evaluation for RF exposure prior to equipment authorization or use, as specified in §§2.1091 and 2.1093 of this chapter.

* * * * *

5. Section 1.9005 is proposed to be amended by adding new paragraph (mm) to read as follows:

§1.9005 Included services.

* * * * *

(mm) The Private Enterprise Broadband Service (part 90 of this chapter).

PART 2—FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

6. The citation for part 2 is proposed to continue to read:

Authority: 47 U.S.C. 154, 302a, 303, and 336, unless otherwise noted.

7. Section 2.1091 is proposed to be amended by modifying paragraph (c)(1) to read as follows:

§2.1091 Radiofrequency radiation exposure evaluation: mobile devices.

* * * * *

(c) * * *

(1) Mobile devices that operate in the Commercial Mobile Radio Services pursuant to part 20 of this chapter; the Cellular Radiotelephone Service pursuant to part 22 of this chapter; the Personal Communications Services pursuant to part 24 of this chapter; the Satellite Communications Services pursuant to part 25 of this chapter; the Miscellaneous Wireless Communications Services pursuant to part 27 of this chapter; the Upper Microwave Flexible Use Service pursuant to part 30 of this chapter; the Maritime Services (ship earth station devices only) pursuant to part 80 of this chapter; the Specialized Mobile Radio Service, the Private Enterprise Broadband Service, and the 3650 MHz Wireless Broadband Service pursuant to part 90 of this chapter; the 76-81 GHz Band Radar Service pursuant to part 95 of this chapter; and the Citizens Broadband Radio Service pursuant to part 96 of this chapter are subject to routine environmental evaluation for RF exposure prior to equipment authorization or use if:

* * * * *

8. Section 2.1093 is proposed to be amended by modifying paragraph (c)(1) to read as follows:

§2.1093 Radiofrequency radiation exposure evaluation: portable devices.

* * * * *

(c) * * *

(1) Portable devices that operate in the Cellular Radiotelephone Service pursuant to part 22 of this chapter; the Personal Communications Service (PCS) pursuant to part 24 of this chapter; the Satellite Communications Services pursuant to part 25 of this chapter; the Miscellaneous Wireless Communications Services pursuant to part 27 of this chapter; the Upper Microwave Flexible Use Service pursuant to part 30 of this chapter; the Maritime Services (ship earth station devices only) pursuant to part 80 of this chapter; the Specialized Mobile Radio Service, the Private Enterprise Broadband Service, the 4.9 GHz Band Service, and the 3650 MHz Wireless Broadband Service pursuant to part 90 of this chapter; the Wireless Medical Telemetry Service (WMTS), the Medical Device Radiocommunication Service (MedRadio), and the 76-81 GHz Band Radar Service pursuant to subparts H, I, and M of part 95 of this chapter, respectively; unlicensed personal communication service, unlicensed NII devices and millimeter-wave devices authorized under §§15.255(g), 15.257(g), 15.319(i), and 15.407(f) of this chapter; and the Citizens Broadband Radio Service pursuant to part 96 of this chapter are subject to routine environmental evaluation for RF exposure prior to equipment authorization or use.

* * * * *

PART 20—COMMERCIAL MOBILE SERVICES

9. The citation for part 20 is proposed to continue to read:

Authority: 47 U.S.C. 151, 152(a) 154(i), 157, 160, 201, 214, 222, 251(e), 301, 302, 303, 303(b), 303(r), 307, 307(a), 309, 309(j)(3), 316, 316(a), 332, 610, 615, 615a, 615b, 615c, unless otherwise noted.

10. Section 20.12 is proposed to be amended by modifying paragraph (a)(1) to read as follows:

§20.12 Resale and roaming.

(a)(1) Scope of manual roaming and resale. Paragraph (c) of this section is applicable to providers of Broadband Personal Communications Services (part 24, subpart E of this chapter), Cellular Radio Telephone Service (part 22, subpart H of this chapter), specialized Mobile Radio Services in the 800 MHz and 900 MHz bands (included in part 90, subpart S of this chapter), and Private Enterprise Broadband (PEBB) Services (included in part 90, subpart AA of this chapter) if such providers offer real-time, two-way switched voice or data service that is interconnected with the public switched network and utilizes an in-network switching facility that enables the provider to re-use frequencies and accomplish seamless hand-offs of subscriber calls. The scope of paragraph (b) of this section, concerning the resale rule, is further limited so as to exclude from the requirements of that paragraph those Broadband Personal Communications Services C, D, E, and F block licensees that do not own and control and are not owned and controlled by firms also holding cellular A or B block licenses.

* * * * *

PART 90—PRIVATE LAND MOBILE RADIO SERVICES

11. The citation for part 90 is proposed to continue to read:

Authority: Sections 4(i), 11, 303(g), 303(r), and 332(c)(7) of the Communications Act of 1934, as amended, 47 U.S.C. 154(i), 161, 303(g), 303(r), and 332(c)(7), and Title VI of the Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. 112-96, 126 Stat. 156.

12. Paragraph 90.7 is proposed to be amended by adding a definition for “Private enterprise broadband” to read as follows:

§90.7 Definitions.

* * * * *

Private enterprise broadband (PEBB) - See section 90.1403 of this part.

* * * * *

13. Section 90.35 is proposed to be amended by modifying paragraph (c)(71) as follows:

§90.35 Industrial/Business Pool.

(c) * * *

(71) Rules for assignment of frequencies in the 806-821/851-866 and 896-901/935-940 MHz bands are contained in Subpart S of this part for narrowband operations and in Subpart AA for Private Enterprise Broadband operations.

* * * * *

14. Section 90.175 is proposed to be amended by modifying paragraph (e) and adding a new paragraph (j)(23) as follows:

§90.175 Frequency coordinator requirements.

* * * * *

(e) For frequencies between 470-512 MHz, 769-775/799-805 MHz, 806-824/851-869 MHz and 896-901/935-940 MHz:

(1) A recommendation of the specific frequencies that are available for assignment in accordance with the loading standards and mileage separations applicable to the specific radio service, frequency pool, or category of user involved is required from an applicable frequency coordinator; including applicants requesting Private Enterprise Broadband system licenses under Section 90.1405(b)(2).

* * * * *

(j) * * *

(23) Private Enterprise Broadband system license issued through competitive bidding.

15. Section 90.205 is proposed to be amended by modifying paragraph (k) as follows:

§90.205 Power and antenna height limits.

* * * * *

(k) 806-824 MHz, 851-869 MHz, 896-901 MHz and 935-940 MHz.

(i) Private Enterprise Broadband operations: Power and height limitations are specified in §90.1419 of this part.

(ii) Narrowband operations: Power and height limitations are specified in §90.635 of this part.

* * * * *

16. Section 90.207 is proposed to be amended by modifying the introductory text and paragraph (a)(2), redesignating paragraph (n) to paragraph (o) and adding a new paragraph (n) as follows:

§90.207 Types of emissions.

Unless specified elsewhere in this part, stations will be authorized emissions as provided for in paragraphs (b) through (o) of this section.

* * * * *

(a) * * *

(2) * * *

7 – Two or more channels containing quantized or digital information.

* * * * *

(n) For stations operating in PEBB systems under subpart AA of this part, D7W, G7D, G7W, and W7D emissions are permitted.

(o) Other emissions. Requests for emissions other than those listed in paragraphs (c) through (n) of this section will be considered on a case-by-case basis to ensure that the requested emission will not cause more interference than other currently permitted emissions.

17. Section 90.209 is proposed to be amended by modifying paragraph (b)(3), the entry for 896-901/935-940 in the table in paragraph (b)(5) and adding a new footnote 7 to the table in paragraph (b)(5) to read as follows:

§90.209 Bandwidth limitations.

* * * * *

(b) * * *

(3) For all other types of emissions, except for emissions associated with PEBB systems under subpart AA of this part, the maximum authorized bandwidth shall not be more than that normally authorized for voice operations.

* * * * *

(5) * * *

Standard Channel Spacing/Bandwidth

Frequency band (MHz)	Channel spacing (kHz)	Authorized bandwidth (kHz)
* * *	* * *	* * *
896-901/935-940[7]	12.5	13.6
* * *	* * *	* * *

* * * * *

[7] Private Enterprise Broadband systems may operate on channels and with bandwidths pursuant to the rules specified in subpart AA of this part.

* * * * *

18. Section 90.210 is proposed to be amended by modifying the entry for 896-901/935-940 in the table in the introductory text and adding a new footnote 7 to the table in the introductory text as follows:

§90.210 Emission masks.

* * * * *

Applicable Emission Masks

Frequency band (MHz)	Mask for equipment with audio low pass filter	Mask for equipment without audio low pass filter
* * *	* * *	* * *
896-901/935-940[7]	I	J
* * *	* * *	* * *

* * * * *

[7] Equipment used with Private Enterprise Broadband systems operating under subpart AA of this part is subject to the emission limitations of 90.1425 of this part.

* * * * *

19. Section 90.213 is proposed to be amended by modifying the entries for 896-901 and 935-940 in the table in paragraph (a) and adding a new footnote 15 to the table in paragraph (a) as follows:

§90.213 Frequency stability.

(a) * * *

Minimum Frequency Stability
[Parts per million (ppm)]

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
* * *	* * *	* * *	* * *
896-901[15]	[14]0.1	1.5	1.5
* * *	* * *	* * *	* * *
935-940[15]	0.1	1.5	1.5
* * *	* * *	* * *	* * *

* * * * *

[15] Equipment used with Private Enterprise Broadband systems operating under subpart AA of this part is exempt from the frequency stability requirements of this section. Instead, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

* * * * *

20. Section 90.601 is proposed to be amended as follows:

§90.601 Scope.

This subpart sets out the regulations governing the licensing and operations of all systems operating in the 806-824/851-869 MHz and 896-901/935-940 MHz bands, except for Private Enterprise Broadband systems operating in the 896-901/935-940 MHz band under subpart AA of this part. It includes eligibility requirements, and operational and technical standards for stations licensed in these bands. It also supplements the rules regarding application procedures contained in part 1, subpart F of this chapter. The rules in this subpart are to be read in conjunction with the applicable requirements contained elsewhere in this part; however, in case of conflict, the provisions of this subpart shall govern with respect to licensing and operation in these frequency bands.

21. Section 90.613 is proposed to be amended as follows:

§90.613 Frequencies available.

The following tables indicate the channel designations of frequencies available for assignment to eligible applicants under this subpart.

(a) Frequencies shall be assigned in pairs, with mobile and control station transmitting frequencies taken from the 806-824 MHz band with corresponding base station frequencies being 45 MHz higher and taken from the 851-869 MHz band. Only the base station transmitting frequency of each pair is listed in the following table.

Table of 806-824/851-869 MHz Channel Designations
[INTENTIONALLY OMITTED]

(b)(1) Frequencies shall be assigned in pairs, with mobile and control station transmitting frequencies taken from the 896-901 MHz band with corresponding base station frequencies being 39 MHz higher and taken from the 935-940 MHz band. Only the base station transmitting frequency of each pair is listed in the following table.

(2) Special provision for channels pursuant to 90.1417 of this part.

No new applications for narrowband systems will be accepted and no applications for modification of existing stations for major changes as defined in §1.929 of this chapter will be accepted on these channels after **[EFFECTIVE DATE OF RULES OF REPORT AND ORDER AUTHORIZING PEBB SYSTEMS]**.

Table of 896-901/935-940 MHz Channel Designations
[INTENTIONALLY OMITTED]

22. Section 90.617 is proposed to be amended by modifying paragraphs (c) and (f) as follows:

§90.617 Frequencies in the 809.750-824/854.750-869 MHz, and 896-901/935-940 MHz bands available for trunked, conventional or cellular system use in non-border areas.

* * * * *

(c)(1) The channels listed in Table 3 are available to applicants eligible in the Industrial/Business Pool of subpart C of this part but exclude Special Mobilized Radio Systems as defined in §90.603(c). These frequencies are available in non-border areas. Specialized Mobile Radio (SMR) systems will not be authorized on these frequencies. These channels are available for intercategory sharing as indicated in §90.621(e).

(2) Special provision for channels pursuant to 90.1417 of this part.

No new applications for narrowband systems will be accepted and no applications for modification of existing stations for major changes as defined in §1.929 of this chapter will be accepted on these channels after **[EFFECTIVE DATE OF RULES OF REPORT AND ORDER AUTHORIZING PEBB SYSTEMS]**.

For multi-channel systems, channels may be grouped vertically or horizontally as they appear in the following table.

Table 3—Business/Industrial/Land Transportation Pool 896-901/935-940 MHZ Band Channels
[199 channels]

Channel Nos.	
11-12-13-14-15	211-212-213-214-215
16-17-18-19-20	216-217-218-219-220
31-32-33-34-35	231-232-233-234-235
36-37-38-39-40	236-237-238-239-240
51-52-53-54-55	251-252-253-254-255
56-57-58-59-60	256-257-258-259-260
71-72-73-74-75	271-272-273-274-275
76-77-78-79-80	276-277-278-279-280
91-92-93-94-95	291-292-293-294-295
96-97-98-99-100	296-297-298-299-300
111-112-113-114-115	311-312-313-314-315
116-117-118-119-120	316-317-318-319-320
131-132-133-134-135	331-332-333-334-335
136-137-138-139-140	336-337-338-339-340
151-152-153-154-155	351-352-353-354-355
156-157-158-159-160	356-357-358-359-360
171-172-173-174-175	371-372-373-374-375
176-177-178-179-180	376-377-378-379-380
191-192-193-194-195	391-392-393-394-395
196-197-198-199-200	396-397-398-399

* * * * *

(f)(1) The channels listed in Tables 6 are available for operations only to eligibles in the SMR category—which consists of Specialized Mobile Radio (SMR) stations and eligible end users. These frequencies are available in non-border areas. The spectrum blocks listed below are available for EA-based services according to §90.681.

(2) Special provision for channels pursuant to 90.1417 of this part.

No new applications for narrowband systems will be accepted and no applications for modification of existing stations for major changes as defined in §1.929 of this chapter will be accepted on these channels after **[EFFECTIVE DATE OF RULES OF REPORT AND ORDER AUTHORIZING PEBB SYSTEMS]**.

Table 6—SMR Category 896-901/935-940 MHz Band Channels
[200 channels]

Block	Channel Nos.
A	1-2-3-4-5-6-7-8-9-10
B	21-22-23-24-25-26-27-28-29-30
C	41-42-43-44-45-46-47-48-49-50
D	61-62-63-64-65-66-67-68-69-70
E	81-82-83-84-85-86-87-88-89-90
F	101-102-103-104-105-106-107-108-109-110
G	121-122-123-124-125-126-127-128-129-130
H	141-142-143-144-145-146-147-148-149-150
I	161-162-163-164-165-166-167-168-169-170
J	181-182-183-184-185-186-187-188-189-190
K	201-202-203-204-205-206-207-208-209-210
L	221-222-223-224-225-226-227-228-229-230
M	241-242-243-244-245-246-247-248-249-250
N	261-262-263-264-265-266-267-268-269-270
O	281-282-283-284-285-286-287-288-289-290
P	301-302-303-304-305-306-307-308-309-310
Q	321-322-323-324-325-326-327-328-329-330
R	341-342-343-344-345-346-347-348-349-350
S	361-362-363-364-365-366-367-368-369-370
T	381-382-383-384-385-386-387-388-389-390

* * * * *

23. Section 90.619 is proposed to be amended by adding new paragraphs (b)(5) and (d)(7) as follows:

§90.619 Operations within the U.S./Mexico and U.S./Canada border areas.

* * * * *

(b) * * *

(5) Special provision for channels pursuant to 90.1417 of this part.

No new applications for narrowband systems will be accepted and no applications for modification of existing stations for major changes as defined in §1.929 of this chapter will be accepted on these channels after **[EFFECTIVE DATE OF RULES OF REPORT AND ORDER AUTHORIZING PEBB SYSTEMS]**.

* * * * *

(d) * * *

(7) Special provision for channels pursuant to 90.1417 of this part.

No new applications for narrowband systems will be accepted and no applications for modification of existing stations for major changes as defined in §1.929 of this chapter will be accepted on these channels after **[EFFECTIVE DATE OF RULES OF REPORT AND ORDER AUTHORIZING PEBB SYSTEMS]**.

24. Part 90 is amended by adding a new subpart AA as follows:

Subpart AA—Regulations Governing Licensing and Use of MSA- and County-Based Private Enterprise Broadband Service in the 896-901 and 935-940 MHz Bands

§90.1401 Scope.

This subpart sets out the regulations governing the licensing and operations of Private Enterprise Broadband systems operating in the 896-901/935-940 MHz bands. It includes eligibility requirements, and operational and technical standards for stations licensed in these bands. It also supplements the rules regarding application procedures contained in part 1, subpart F of this chapter. The rules in this subpart are to be read in conjunction with the applicable requirements contained elsewhere in this part; however, in case of conflict, the provisions of this subpart shall govern with respect to licensing and operation in these frequency bands.

§90.1403 Definitions.

Terms used in this subpart shall have the following meanings:

(a) *Incumbent Licensee*. The term "incumbent licensee" shall mean:

(1) Any business/industrial/land transportation (B/ILT), including critical infrastructure industry (CII) (as defined in §90.7), or Specialized Mobile Radio (SMR) (as defined in §90.7) entity holding a site-based license authorizing it to operate in the spectrum designated for Private Enterprise Broadband systems as specified in section 90.1417 of this part; that, as of [THE EFFECTIVE DATE OF THIS SUBPART], has certified construction pursuant to and in compliance with its license authorizations and

(2) Any entity holding a Major Trading Area (MTA) license authorizing it to operate in the spectrum designated for Private Enterprise Broadband systems as specified in section 90.1417 of this part; that, as of [THE EFFECTIVE DATE OF THIS SUBPART], has certified construction pursuant to and in compliance with its license authorizations.

(b) *MSA*. The term "MSA" shall mean a Metropolitan Statistical Area as defined in §22.909(a) of this chapter.

(c) *Private Enterprise (PE)*. The term "Private Enterprise" shall mean the private enterprise user community, including B/ILT and CII users.

(d) *Private Enterprise Broadband (PEBB)*. The term "Private Enterprise Broadband" shall mean the market-Based Private Enterprise Broadband systems in the 897.6-900.6/936.6-939.6 MHz band licensed by the Commission pursuant to the provisions of this subpart.

(e) *Private Enterprise Broadband (PEBB) Licensee*. The term "Private Enterprise Broadband licensee" shall mean any entity that is issued a PEBB license by the Commission pursuant to §90.1405(b)(2) or §90.1405(b)(3).

§90.1405 Licensing of the 897.6-900.6/936.6-939.6 MHz band.

(a) *In General*. The Commission will issue a single license for the Private Enterprise Broadband Service in the top 306 Cellular Market Areas ("CMAs") and in individual counties in the remaining 428 CMAs. The Commission will continue to license spectrum in the 896-897.6/935-936.6 and the 900.6-901/939.6-940 MHz bands for site-based and geographic narrowband operations and services in accordance with the provisions of subpart S of this part.

(b) *Private Enterprise Broadband Authorizations*.—(1) Spectrum licenses in the 897.6-900.6/936.6-939.6 MHz shall be designated for Private Enterprise Broadband, and shall have the following conditions:

(i) Compliance with mandatory negotiation obligations pursuant to §90.1409(b) of this part;

(ii) Compliance with reimbursement obligations pursuant to §90.1413(b) of this part;

(iii) Compliance with requirements for the provision of comparable facilities to incumbent licensees retuning their systems to spectrum frequencies in the 896-901/935-940 MHz band as permitted under the provisions of subpart S of this part, pursuant to §90.1413(c) of this part; and

(iv) Compliance with interference protection obligations pursuant to §90.1427 of this part.

(2) Coordinated applications: The following provisions are available only to PE/CII entities filing applications for PEBB licenses:

(i) As soon as practicable after the effective date of this subpart, the Commission will provide notice of the date on which Frequency Advisory Committee (FACs) certified by the FCC to coordinate applications for spectrum authorized under Subpart S of the rules are permitted to accept applications for PEBB licenses from PE/CII entities ("Coordination Date") and the date when such applications may be certified to and filed with the Commission ("Filing Date"). All such applications must be filed with the Commission within 365 days of the Filing Date ("PE/CII Filing Period").

(ii) The PE/CII PEBB applicant must document to the satisfaction of the FAC that within the MSA or county for which it is applying it is the licensee of or has the contractual right to a number of discrete channels in the 900 MHz band, which channels, together with any 900 MHz channels held by the Commission in that MSA or county, as confirmed by the FAC, equal 240 discrete 900 MHz band channels, thereby qualifying it to exchange the discrete channels for the PEBB license.

(iii) The Commission, after confirming compliance with all applicable regulations, will issue a Private Enterprise Broadband license to the PE/CII applicant and will reserve for relocation of incumbent licensees any channels in the 896-897.6/935-936.6 and the 900.6-901/939.6-940 MHz bands surrendered by the applicant in exchange for the PEBB license ("Reserved Channels").

(3) Competitive Bidding Applications. The Commission will announce by public notice, the rules and procedures for commencement of a competitive bidding process for MSAs and counties for which no PE/CII PEBB application was filed. All entities eligible under the Part 90 rules qualify to participate in the competitive bidding process. Upon completion of the competitive bidding process, and upon acceptance of their applications, the Commission will issue Private Enterprise Broadband licenses to winning bidders.

(c) *License Term*. Private Enterprise Broadband licenses authorized under this subpart will be issued for a term not to exceed ten (10) years from the date of the original issuance or renewal, as specified in §90.149 of this part.

(d) *License Renewal*. Prior to the expiration of the term of a Private Enterprise Broadband license, the PEBB licensee shall submit to the Commission an application for the renewal of such license. Such renewal application shall demonstrate that, during the preceding license term, the PEBB licensee has satisfied the PEBB license conditions set forth in paragraph (b)(1) of this section and has complied with any other requirements or obligations applicable to the PEBB license.

(e) *Filing requirements*.

(1) Applications for facilities in the Private Enterprise Broadband Service must be prepared on FCC Form 601 and must be submitted or filed in accordance with §90.127 of this part and part 1, subpart F of this chapter.

(2) A PEBB licensee that permanently discontinues service as defined in this section must notify the Commission of the discontinuance within 10 days by filing FCC Form 601 requesting license cancellation. An authorization will automatically terminate, without specific Commission

action, if service is permanently discontinued as defined in this section, even if a licensee fails to file the required form requesting license cancellation.

§90.1407 The realignment process.

The PEBB licensee shall take such actions as it determines, in its discretion, to be necessary or appropriate to provide for the management, administration, and oversight of the process by which appropriate replacement frequencies will be identified and designated for use by incumbent licensees that are operating in the spectrum designated for Private Enterprise Broadband systems as specified in section 90.1417 of this part and that will be transitioned to frequencies in the 896-901/935-940 MHz band or other comparable facilities as permitted under the provisions of subpart S of this part available for site-based and geographic narrowband operations and services.

§90.1409 Realignment agreements between the PEBB licensee and incumbent licensees.

(a) *Voluntary Negotiations*.—(1) Either an incumbent licensee or the PEBB licensee may initiate voluntary negotiations for an agreement providing for the retuning of such incumbent licensee's system to frequencies in the 896-901/935-940 MHz band or other comparable facilities as permitted under the provisions of subpart S of this part by delivering written notification to the non-initiating party.

(2) The non-initiating party shall respond to the notification not later than thirty (30) days following the date of receipt. Such voluntary negotiations shall occur during the one-year period following the date of such notification.

(b) *Mandatory Negotiations*.—(1) A one-year period for the mandatory negotiation of an agreement between the PEBB licensee and any incumbent licensee operating in a particular MSA or county in the spectrum designated for Private Enterprise Broadband systems as specified in section 90.1417 of this part, for the retuning of such incumbent licensee's system to frequencies in the 896-901/935-940 MHz band as permitted under the provisions of subpart S of this part, shall commence—

(i) at the close of the one-year period specified in paragraph (a)(2) of this section, if voluntary negotiations pursuant to paragraph (a) of this section have not resulted in an agreement by the close of such one-year period; or

(ii) at the close of the thirty (30)-day period specified in paragraph (a)(2) of this section, if the non-initiating party does not respond to the request of the initiating party within such thirty (30)-day period.

(2) Upon the commencement of the mandatory negotiation period specified in paragraph (b)(1) of this section, neither the PEBB licensee nor the incumbent licensee may refuse to negotiate, and each party to a mandatory negotiation is required to negotiate in good faith. Good faith requires each party to provide information to the other party that is reasonably necessary to facilitate the retuning process. In evaluating claims that a party has not negotiated in good faith, the Commission will consider various factors, including the following:

(i) Whether the PEBB licensee has made a bona fide offer to retune the incumbent licensee's system to comparable facilities, and to provide for the reimbursement of costs associated with such retuning, in accordance with §90.1413 of this part;

(ii) If the incumbent licensee has demanded a premium, the type of premium requested, and whether the value of the premium as compared to the cost of providing comparable facilities is disproportionate;

(iii) What steps the parties have taken to determine the actual cost of retuning the incumbent licensee's system to comparable facilities; and

(iv) Whether either party has withheld information requested by the other party that is necessary to estimate retuning costs or to facilitate the retuning process.

(3) Any party alleging a violation of the good faith requirement established in paragraph (b)(2) of this section shall provide, as part of any documentation filed with the Commission in support of its claim, an independent estimate of the retuning costs at issue in the negotiations. Such independent estimate shall include a specification for the comparable facilities and a statement of the costs associated with providing such facilities to the incumbent licensee.

(c) *Mediation*.—(1) In any case in which—

(i) Mandatory negotiations pursuant to paragraph (b) of this section do not result in an agreement between the PEBB licensee and an incumbent licensee by the close of the one-year period specified in paragraph (b)(1) of this section; and

(ii) The incumbent licensee believes the PEBB realignment proposal will not provide it with comparable facilities and/or does not address all costs reasonably associated with realignment; such incumbent licensee may initiate mediation pursuant to this paragraph by preparing a detailed written explanation of its objections for consideration by a mediator ("Mediator"). Such explanation shall be submitted to the Mediator selected pursuant to paragraph (c)(2) of this section not later than thirty (30) days after the close of the one-year period specified in paragraph (b)(1) of this section. If such incumbent licensee elects not to initiate mediation, then such incumbent licensee shall be subject to involuntary realignment pursuant to §90.1411 of this part.

(2) If an incumbent licensee initiates a mediation pursuant to paragraph (c)(1) of this section, the matter shall be settled by mediation conducted by three qualified mediators. The incumbent licensee and the PEBB licensee shall each select one mediator, and the two mediators so selected shall select a third mediator. The mediators shall (by the decision of at least two of the three mediators) set a limited time period and establish procedures designed to reduce the cost and time for each of the parties to prepare and submit their respective positions and supporting arguments and data, while allowing each of the parties an opportunity to formulate and deliver a response to matters raised by the other party or by the mediators. The mediators shall deliver their final decision in writing to each of the parties and the decision of a majority of the three mediators shall be binding and conclusive upon both parties.

(3) All Mediator decisions shall be final and non-appealable, except that Mediator decisions shall not preclude or otherwise affect the filing of a claim by any party with the Commission pursuant to paragraph (b)(2) and paragraph (b)(3) of this section, alleging the violation of the good faith requirement specified in paragraph (b)(2) of this section.

§90.1411 Involuntary realignments.

(a) In any case in which— (1) No agreement is reached between the PEBB licensee and an incumbent licensee pursuant to mandatory negotiations required by §90.1409(b) of this part; and

(b) either (1) the Mediator has approved a realignment proposal in a decision issued in accordance with §90.1409(c), or

(2) such incumbent licensee has elected not to initiate mediation within the time period specified in §90.1409(c) of this part;

the PEBB licensee may request the Commission to initiate involuntary retuning procedures consistent with the Mediator's decision (in the circumstances described in paragraph(b)(i) of this section) or consistent with the PEBB licensee's final realignment proposal to the incumbent licensee involved (in the circumstances described in paragraph (b)(ii) of this section), as appropriate. Under such procedures, the incumbent licensee is required to retune its system to replacement frequencies in the 896-901/935-940 MHz band as permitted under the provisions of subpart S of this part, if the PEBB licensee guarantees payment of retuning costs and the provision of comparable facilities in accordance with §90.1413 of this part.

§90.1413 Reimbursement of retuning costs; comparable facilities.

(a) *In General*. Any incumbent licensee that retunes its system pursuant to the provisions of §90.1409 or §90.1411 of this part from the spectrum designated for Private Enterprise Broadband systems as specified in §90.1417 of this part to spectrum in the 896-901/935-940 MHz band as permitted under the provisions of subpart S of this part or to other spectrum on which it will have comparable facilities shall have the costs associated with such retuning paid by the PEBB licensee, and shall be provided with facilities comparable to those it utilized in spectrum it vacates, in accordance with the provisions of this section.

(b) *Retuning Costs*. (1) Any PEBB licensee that is a party to a mandatory negotiation agreement made pursuant to §90.1409(b), or that holds the PEBB license for an MSA or county in which any incumbent licensee is subject to an involuntary retuning pursuant to §90.1411 of this part, is responsible for paying all costs (as specified in paragraph (b)(2) of this section) incurred in connection with:

(i) Retuning the system of such incumbent licensee to frequencies in the 896-901/935-940 MHz band as permitted under the provisions of subpart S of this part; and

(ii) Ensuring that the replacement frequencies provide the incumbent licensee with comparable facilities as defined by the factors specified in paragraph (c) of this section.

(2) The costs referenced in paragraph (b)(1) of this section shall include all internal, engineering, equipment, and site-related costs, Commission fees, and any legitimate and prudent transaction expenses incurred by an incumbent licensee that are directly attributable to:

(i) A retuning effectuated by a mandatory negotiation agreement made pursuant to §90.1409(b) of this part; or

(ii) An involuntary retuning pursuant to §90.1411 of this part.

(c) *Comparable Facilities*.—(1) The retuned system provided to an incumbent licensee pursuant to §90.1409(b) or §90.1411 of this part shall be at least equivalent to the existing system operated by such incumbent licensee in the spectrum designated for Private Enterprise Broadband systems as specified in section 90.1417 of this part with respect to the following factors:

(i) For purposes of paragraph (c)(1) of this section, the retuned "system" shall be defined functionally from the point of view of the end user, and shall be comprised of base station facilities that operate on an integrated basis to provide service to a common end user, and all mobile stations or portable stations associated with such base stations. A system may include multiple-licensed facilities that share a common switch or are otherwise operated as a unitary system, provided that the end user has the ability to access all such facilities.

(ii) To meet the comparable facilities requirement, the incumbent licensee shall be provided with facilities that provide equivalent channel capacity. For purposes of this paragraph (c)(1)(ii), "channel capacity" shall mean the same number of channels with the same bandwidth that is currently available to the incumbent licensee. If a different channel configuration is used by the realigned system, such channel configuration shall have the same overall capacity as the original configuration used by the incumbent licensee. Comparable channel capacity requires equivalent signaling capability, baud rate, and access time. The geographic coverage of the channels shall be at least coextensive with that of the original system.

(iii) Comparable facilities shall provide the same quality of service as the facilities being retuned. For purposes of paragraph (c)(1) of this section:

(A) "Quality of service" shall mean that the end user receives the same level of interference protection and the same reliability of service; and

(B) "Reliability" shall mean the degree to which information is transferred accurately within the system. Reliability is a function of equipment failures, and the availability of the frequency channel due to propagation characteristics. For digital data systems, reliability shall be measured by the percentage of time the bit error rate exceeds the desired value.

(iv) For purposes of paragraph (c)(1) of this section, "operating costs" shall mean those costs that affect the delivery of services to the end user. The following provisions shall govern the treatment of operating costs:

(A) If the retuned system entails higher operating costs than those associated with the original system, and if the cost increase is a direct result of the retuning, then the PEBB licensee shall compensate the incumbent licensee for the difference in costs;

(B) The incumbent licensee shall be compensated by the PEBB licensee for any increased recurring costs associated with the retuned system, such as additional rental payments or increased utility fees;

(C) Increased maintenance costs shall be taken into consideration when determining whether operating costs are comparable; and

(D) The obligation of the PEBB licensee to pay any increase in the operating costs shall terminate at the end of the five (5)-year period following the retuning of the system operated by the incumbent licensee.

(2) In any case in which the PEBB licensee is not able to provide a replacement system to an incumbent licensee pursuant to §90.1409(b) or §90.1411 of this part that would be at least equivalent to the existing system operated by such incumbent licensee in the spectrum designated for Private Enterprise Broadband systems as specified in section 90.1417 of this part, the incumbent licensee shall not be required to retune its existing system and shall receive appropriate interference protection from PEBB licensees operating Private Enterprise Broadband systems in the MSA or county in which the incumbent system operates and in adjacent MSAs or counties, in accordance with the requirements of subpart S of this part.

§90.1415 [Reserved]

§90.1417 Frequencies

896-901 MHz and 935-940 MHz bands. The

- 897.6 – 900.6 MHz and 936.6 – 939.6 MHz band segments are available for licensing with an authorized bandwidth up to 3 megahertz.
- The 897.6 – 900.6 MHz segment must only be used for uplink transmissions
- The 936.6 – 939.6 MHz segments must only be used for downlink transmissions.

§90.1419 Effective radiated power limits for PEBB systems.

(a) Maximum ERP. The power limits specified in this section are applicable to operations outside the Canadian and Mexican sharing zones. Power limits for operation in those areas are specified in section 90.1423 of this part.

(1) General Limit.

(i) The ERP for base and repeater stations must not exceed 400 watts/megahertz power spectral density (PSD) per sector and an antenna height of 305 m height above average terrain (HAAT), except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 400 watts/megahertz ERP in accordance with Table 1 of paragraph (e) of this section.

(ii) Except provided that they also comply with paragraphs (b) and (c) of this section, licensees are permitted to operate base and repeater stations with up to a maximum ERP of 1000 watts/megahertz (PSD) per sector and an antenna height of 305 m height above average terrain (HAAT), except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 1000 watts/megahertz ERP in accordance with Table 2 of paragraph (e) of this section.

(2) Rural Areas. For systems operating in areas more than 110 km (68.4 miles) from the U.S./Mexico border and 140 km (87 miles) from the U.S./Canadian border that are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census

(i) The ERP for base and repeater stations must not exceed 800 watts/megahertz (PSD) per sector and an antenna height of 305 m height above average terrain (HAAT), except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 800 watts/megahertz ERP in accordance with Table 3 of paragraph (e) of this section.

(ii) Except provided that they also comply with paragraphs (b) and (c) of this section, base and repeater stations may operate with up to a maximum of 2000 watts/megahertz (PSD) per sector and an antenna height of 305 m height above average terrain (HAAT), except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 2000 watts/megahertz ERP in accordance with Table 4 of paragraph (e) of this section.

(3) Mobile, control and auxiliary test stations must not exceed 10 watts ERP.

(4) Portable stations must not exceed 3 watts ERP

(b) *Power flux density (PFD).* Each PEBB base or repeater station that exceeds the ERP limit of paragraphs (a)(1)(i) or (a)(2)(i) of this section must be designed and deployed so as not to exceed a modeled power flux density (PFD) of 3000 microwatts/m^2/MHz over at least 98% of the area within 1 km of the base or repeater station antenna, at 1.6 meters above ground level. To ensure compliance with this requirement, the licensee must perform predictive modeling of the PFD values within at least 1 km of each base or repeater station antenna prior to commencing such operations and, thereafter, prior to making any site modifications that may increase the PFD levels around the base or repeater station. The modeling must take into consideration terrain and other local conditions and must use good engineering practices for the 900 MHz band.

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(c) *Power measurement.* Measurement of PEBB base transmitter and repeater ERP must be made using an average power measurement technique. Power measurements for base transmitters and repeaters must be made in accordance with either of the following:

(1) A Commission-approved average power technique (*see* FCC Laboratory's Knowledge Database); or

(2) For purposes of this section, peak transmit power must be measured over an interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, *etc.*, so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

(d) *PAR limit*. The peak-to-average ratio (PAR) of the transmission must not exceed 13 dB.

(e) *Height-power limit.* As specified in paragraph (a) of this section, the following tables specify the maximum base station power for antenna heights above average terrain (HAAT) that exceed 305 meters.

Table 1 – Permissible Power And Antenna Heights For Base Stations permitted to transmit with up to 400 watts/megahertz

Antenna height (AAT) in meters (feet)	Effective radiated power (ERP) (watts/megahertz)
Above 1372 (4500)	26
Above 1220 (4000) To 1372 (4500)	28
Above 1067 (3500) To 1220 (4000)	30
Above 915 (3000) To 1067 (3500)	40
Above 763 (2500) To 915 (3000)	56
Above 610 (2000) To 763 (2500)	80
Above 458 (1500) To 610 (2000)	140
Above 305 (1000) To 458 (1500)	240
Up to 305 (1000)	400

Table 2 – Permissible Power And Antenna Heights For Base Stations permitted to transmit with up to 1000 watts/megahertz

Antenna height (AAT) in meters (feet)	Effective radiated power (ERP) (watts/megahertz)
Above 1372 (4500)	65
Above 1220 (4000) To 1372 (4500)	70
Above 1067 (3500) To 1220 (4000)	75
Above 915 (3000) To 1067 (3500)	100
Above 763 (2500) To 915 (3000)	140
Above 610 (2000) To 763 (2500)	200
Above 458 (1500) To 610 (2000)	350
Above 305 (1000) To 458 (1500)	600
Up to 305 (1000)	1000

Table 3 – Permissible Power And Antenna Heights For Base Stations permitted to transmit with up to 800 watts/megahertz

Antenna height (AAT) in meters (feet)	Effective radiated power (ERP) (watts/megahertz)
Above 1372 (4500)	52
Above 1220 (4000) To 1372 (4500)	56
Above 1067 (3500) To 1220 (4000)	60
Above 915 (3000) To 1067 (3500)	80
Above 763 (2500) To 915 (3000)	112
Above 610 (2000) To 763 (2500)	160
Above 458 (1500) To 610 (2000)	280
Above 305 (1000) To 458 (1500)	480
Up to 305 (1000)	800

Table 4 – Permissible Power And Antenna Heights For Base Stations permitted to transmit with up to 2000 watts/megahertz

Antenna height (AAT) in meters (feet)	Effective radiated power (ERP) (watts/megahertz)
Above 1372 (4500)	130
Above 1220 (4000) To 1372 (4500)	140
Above 1067 (3500) To 1220 (4000)	150
Above 915 (3000) To 1067 (3500)	200
Above 763 (2500) To 915 (3000)	280
Above 610 (2000) To 763 (2500)	400
Above 458 (1500) To 610 (2000)	700
Above 305 (1000) To 458 (1500)	1200
Up to 305 (1000)	2000

§90.1421 Field Strength Limit.

The predicted or measured median field strength must not exceed 40 dBµV/m at any given point along the PEBB market boundary of a neighboring PEBB licensee on the same channel block, unless the affected licensee agrees to a different field strength. This value applies to both the initially offered service areas and to partitioned service areas.

§90.1423 Operation near international borders.

(a) Operation within the Mexican sharing zone.

(1) The Mexican sharing zone is defined as the areas covered by a distance of 110 kilometers (68.35 miles) from the U.S.-Mexico common border into the national territory of each country and includes areas of the Pacific Ocean and the Gulf of Mexico.

(2) PEBB operations within the sharing zone shall comply with the power/antenna height limits specified in Table 1:

TABLE 1: LIMITS ON EFFECTIVE RADIATED POWER (ERP) AND ANTENNA HEIGHT

Average of the Antenna Height Above Average Terrain on Standard Radials in the Direction of the Common Border[2, 3]	**Maximum ERP in Any Direction Toward the Common Border per 25 kHz**
Meters	**Watts per 25 kHz (Maximum)**
0 to 503	500
Above 503 to 609	350
Above 609 to 762	200
Above 762 to 914	140
Above 914 to 1066	100
Above 1066 to 1219	75
Above 1219 to 1371	70
Above 1371 to 1523	65
Above 1523	5

[2] Standard radials are 000º, 045º, 090º, 135º, 180º, 225º, 270º, 315º, relative to True North.

[3] The Height Above Average Terrain on any standard radial is based on the average terrain elevation above mean sea level.

(3) Power flux density limit.

(i) The maximum power flux density (PFD) at any point at or beyond the border shall not exceed -107 dBW/m^2 per 25 kHz bandwidth.

(ii) The PEBB licensee may exceed the PFD limit of paragraph (a)(3)(i) of this section if both Administrations and all potentially affected Mexican operators in the 898.50625 – 900.600 MHz/937.50625 – 939.600 MHz bands that operate in areas contiguous to the PEBB licensed MSA or county on opposite sides of the U.S.-Mexican border agree to the proposed PFD level.

(d) *Operation within the Canadian sharing zone.* The following criteria shall govern the use of PEBB stations located in the U.S./Canada border area in the 897.6-900.6 MHz / 936.6-939.6 MHz. band.

(1) Sharing Regions. Table 2 lists the U.S./Canada sharing regions in the border area.

TABLE 2: SHARING REGIONS IN THE 896-901/935-940 MHZ FREQUENCY BANDS ALONG THE U.S./CANADA BORDER AREA

Region	Location (longitude)
1	66° W-71° W. (0-100 km from border)
2	71° W-80°30′ W (0-100 km from border)
3	80°30′ W-85° W (0-100 km from border)
4	85° W-121°30′ W (0-100 km from border)
5	121°30′ W-127° W (0-140 km from border)
6	127° W-143° W (0-100 km from border)
7	66° W-121°30′ W (100-140 km from border)
8	127° W-143° W (100-140 km from border)

Note: For assignments in the 896-901/935-940 MHz bands, the cities of Akron, Ohio (41°05′00″ N, 81°30′40″ W) and Youngstown, Ohio (41°05′57″ N, 80°39′02″ W) are considered outside of Region 3, and Syracuse, New York (43°03′04″ N, 76°09′14″ W) is considered outside of Region 2. These cities are defined as an area with the given center coordinates and encompassing a circle of 30 km radius.

(2) Within Regions 1-6, PEBB systems may operate such that the maximum power flux density (PFD) of the station's transmitted signal does not exceed the limits specified in tables 4 and 5. The spreading loss shall be calculated using the free space formula taking into account any antenna discrimination in the direction of the border. PEBB operations will be secondary to Canadian operations on frequencies corresponding to the channel listed in table 3 and conditioned to require that licensees take immediate action to eliminate any harmful interference resulting from the station's transmitted signal exceeding the values specified in tables 29 or 30 at or beyond the U.S./Canada border.

TABLE 3—ADDITIONAL CHANNELS AVAILABLE
[Regions 1-6]

Region	Channel No.'s	Effective radiated power
1	201-368	See Table 29
2	128-368	See Table 29
3	341-368	See Table 29
4	201-368	See Table 29
5	201-368	See Table 30
6	201-368	See Table 29

TABLE 4—MAXIMUM POWER FLUX DENSITY (PFD) AT THE U.S./CANADA BORDER CORRESPONDING TO EFFECTIVE ANTENNA HEIGHT
[Regions 1, 2, 3, 4, and 6]

Effective antenna height (EAH)		
Feet	**Meters**	**PFD (dBW/m^2)**
0-500	0-152	−84
501-1000	153-305	−90
1001-1500	306-457	−95
1501-2000	458-609	−98
2001-2500	610-762	−101
2501-3000	763-914	−101
3001-3500	915-1066	−103
3501-4000	1067-1219	−104
Above 4000	Above 1219	−104

TABLE 5—MAXIMUM POWER FLUX DENSITY (PFD) AT THE U.S./CANADA BORDER CORRESPONDING TO ANTENNA HEIGHT ABOVE MEAN SEA LEVEL
[Region 5]

Antenna height above mean sea level		
Feet	**Meters**	**PFD (dBW/m^2)**
0-1650	0-503	−87.0
1651-2000	504-609	−88.5
2001-2500	610-762	−91.0
2501-3000	763-914	−92.5
3001-3500	915-1066	−94.0
3501-4000	1067-1219	−95.0
4001-4500	1220-1371	−95.5
4501-5000	1372-1523	−96.0
Above 5000	Above 1523	−107.0

(3) *Additional provisions for Region 5*. In Region 5, PEBB systems may be authorized in the United States under the following conditions:

(i) An assignment may be made if the predicted power flux density (PFD) of a proposed station's signal does not exceed −107 dBW/m^2 at the border. The prediction of the PFD is calculated based upon a modified Longley-Rice point-to-point propagation model with time and location variabilities of 10 percent and 3-second digitized terrain date.

(ii) Within Channels 201-397 (898.5125-900.9625 MHz / 937.5125-939.9625 MHz) in Region 5, operations are secondary to Canadian operations and conditioned to require that licensees take immediate action to eliminate any harmful interference resulting from the station's transmitted signal exceeding −107 dBW/m^2 at or beyond the U.S./Canada border.

(4) *Additional provisions for Region 1*. For stations located within the geographical area in Region 1 enclosed by the United States-Canada border, the meridian 71° W and the line beginning at the intersection of 44°25′ N, 71° W, then running by great circle arc to the intersection of 45° N, 70° W, then North along meridian 70° W to the intersection of 45°45′ N, then running West along 45°45′ N to the intersection of the United States-Canada border, operations are secondary to Canadian operations and conditioned to require that licensees take immediate action to eliminate any harmful interference that may occur to channels 128 through 160, inclusive, (897.600-898.000 MHz / 936.600-937.000 MHz).

(5) *Additional provisions for Region 3*. For stations located within the geographical area in Region 3 enclosed by the meridian of 81° W longitude, the arc of a circle of 100 km radius centered at 42°39′30″ N latitude and 81° W longitude at the northern shore of Lake Erie and drawn clockwise from the southerly intersection with 80°30′ W longitude to intersect the United States-Canada border West of 81° W, and the United States-Canada border, operations are secondary to Canadian operations and conditioned to require that licensees take immediate action to eliminate any harmful interference that may occur to channels 128 through 160, inclusive, (897.600-898.8750 MHz / 936.600-937.8750 MHz).

(c) PEBB licensees shall be subject to all applicable provisions and requirements of treaties and other international agreements between the United States government and the governments of Canada and Mexico, notwithstanding paragraphs (a) and (b) of this section.

§90.1425 Emission limits.

The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power P in watts by at least the following amounts:

(a) For PEBB operations in 896-901 MHz band by at least 43 + 10 log (P) dB.

(b) For PEBB operations in the 935-940 MHz band, by at least 50 + 10 log (P) dB.

(c) *Measurement procedure*. Compliance with the provisions of paragraphs (a) and (b) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the licensee's band, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(d) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

§90.1427 Interference protection rights.

(a) *In General*.—Harmful interference from a PEBB licensee to systems operating on narrowband assignments in 896-901/935-940MHz will be deemed to occur when a transceiver at a site at which interference is encountered—

(1) Is in good repair and operating condition;
(2) Is receiving—

(i) A median desired signal strength of −98 dBm or higher if operating pursuant to (a), as measured at the R.F. input of the receiver of a mobile unit; or

(ii) A median desired signal strength of –95 dBm if operating pursuant to (a), as measured at the R.F. input of the receiver of a portable station (hand-held device); and

(3) Is either—

(i) A voice transceiver—

(A) With manufacturer-published performance specifications for the receiver section of the transceiver equal to, or exceeding, the minimum standards set out in paragraph (b) of this section; and

(B) Receiving an undesired signal or signals which cause the measured Carrier to Noise plus Interference (C/(I+N)) ratio of the receiver section of such voice transceiver to be less than 17 dB if operating on frequencies in the pursuant to (a), or

(ii) A non-voice transceiver receiving an undesired signal or signals which cause the measured bit error rate (BER) (or some comparable specification) of the receiver section of such non-voice transceiver to be more than
the value reasonably designated by the manufacturer for transceivers operating on frequencies pursuant to paragraph (a) of this section.

(b) *Minimum Receiver Requirements*.—Voice transceivers capable of operating on frequencies pursuant to (a) shall have the following minimum performance specifications in order for the system in which such transceivers are used to claim entitlement to full protection against harmful interference from a PEBB licensee. Voice units intended for mobile or portable use pursuant to paragraph (a) of this section: 60 dB intermodulation rejection ratio; 60 dB adjacent channel rejection ratio; –116 dBm reference sensitivity.

(c) *Harmful Interference Claims; Mitigation Steps*.—(1) If there is a claim of harmful interference from a PEBB licensee to non- PEBB licensee equipment that is certified and operated in compliance with the emission limitations in paragraph (a) of this section, the claimant shall have the right to submit its complaint to a website to be established and maintained by PEBB licensees collectively. The complaint, at a minimum, shall include the following information:

(i) The coordinates, street address, county, and state of the location where the interference is experienced, and the time or times at which it occurred;

(ii) A description of the scope and severity of the issue, including the source, if known;

(iii) The affected party's call sign(s); and

(iv) A single point of contact for the complainant.

(2) If the PEBB licensee is responsible for causing any harmful interference, the PEBB licensee shall resolve such interference in the shortest time practicable. The PEBB licensee shall provide all necessary test apparatus and technical personnel skilled in the operation of such equipment as may be necessary to determine the most appropriate means of timely eliminating the interference. However, the means whereby interference is abated or the cell parameters that may need to be adjusted is left to the discretion of the PEBB licensee, whose affirmative measures may include, but not be limited to, the following techniques:

(i) Increasing the desired power of the claimant's signal;

(ii) Decreasing the power of the signal generated by the PEBB licensee's equipment;

(iii) Modifying the height of antennas utilized by the PEBB licensee's system;

(iv) Modifying the characteristics of such antennas;

(v) Incorporating filters into the PEBB licensee's transmission equipment; and

(vi) Supplying interference-resistant receivers to the claimant.

(3) If the technique described in paragraph (b)(2)(vi) is used, then, in all circumstances, the PEBB licensee shall be responsible for all costs thereof.

(4) Whenever short-term interference abatement measures prove inadequate, the incumbent licensee shall, consistent with but not compromising safety, make all necessary concessions to accepting interference until a longer-term remedy can be implemented.