

FACT SHEET*

Transitioning the 900 MHz Band to Enable Broadband Deployment

Report and Order, Order of Proposed Modification, and Orders - WT Docket No. 17-200

Background: To meet the increasing spectrum capacity demands of a wide range of industries, including utilities, this proposed Report and Order, Order of Proposed Modification, and Orders would transform the 900 MHz band (896-901/935-940 MHz) to make available six megahertz of low-band spectrum for broadband services and technologies.

What the Report and Order Would Do:

- Realign the band to make available six megahertz of spectrum for broadband operations, while reserving the band's remaining four megahertz for continued narrowband operations.
- Establish a transition mechanism, based primarily on negotiations between prospective broadband licensees and narrowband incumbents, that enables these prospective broadband licensees to relocate, acquire, or protect existing incumbents in the new broadband segment.
- Permit a 900 MHz broadband licensee (after license grant) to relocate mandatorily a small number of incumbents—except those with complex systems—from the new broadband segment to the narrowband segment by providing comparable facilities.
- Require a broadband applicant to make an anti-windfall payment whenever it relinquishes less than six megahertz of spectrum in exchange for a six megahertz broadband license.
- Address license application requirements, transition procedures, and operating and technical rules applicable to the new 900 MHz broadband license.

What the Order of Proposed Modification Would Do:

- Propose to modify the Association of American Railroads' narrowband-channel nationwide ribbon license surrounding railroad rights-of-way to facilitate the 900 MHz band transition and to enable significant advancements to railroad safety.

What the Orders Would Do:

- Deny Enterprise Wireless Alliance's petition for rulemaking, which requested that the Commission designate part of the 800 MHz guardband for relocation of 900 MHz narrowband channels.
- Lift the freeze on 900 MHz applications so that existing licensees can relocate their narrowband operations within the narrowband segment.

* This document is being released as part of a "permit-but-disclose" proceeding. Any presentations or views on the subject expressed to the Commission or its staff, including by email, must be filed in WT Docket No. 17-200, which may be accessed via the Electronic Comment Filing System (<https://www.fcc.gov/ecfs/>). Before filing, participants should familiarize themselves with the Commission's *ex parte* rules, including the general prohibition on presentations (written and oral) on matters listed on the Sunshine Agenda, which is typically released a week prior to the Commission's meeting. See 47 CFR § 1.1200 et seq.

**Before the
Federal Communications Commission
Washington, D.C. 20554**

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

REPORT AND ORDER, ORDER OF PROPOSED MODIFICATION, AND ORDERS*

Adopted: []

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By the Commission:

TABLE OF CONTENTS

Heading	Paragraph #
I. INTRODUCTION.....	1
II. BACKGROUND.....	3
III. REPORT AND ORDER	20
A. Transition of 900 MHz Band to Enable Broadband Deployment.....	22
1. Band Realignment to Create a 3/3 Megahertz Broadband Segment	27
2. Transition Process	38
3. Preventing Disruption to Railways and Order Proposing Modification.....	96
B. Obtaining a 900 MHz Broadband License in a County	108
1. License Application.....	108
2. Implementation Procedures.....	114
C. Licensing and Operating Rules	118
1. Broadband Segment	119
2. Narrowband Segments	142
D. Technical Rules.....	145
1. Broadband Segment	145
2. Narrowband Segments	164
E. Cost-Benefit Analysis	166
IV. ORDER DENYING EWA PETITION FOR RULEMAKING	172

* This document has been circulated for tentative consideration by the Commission at its May 2020 open meeting. The issues referenced in this document and the Commission's ultimate resolution of those issues remain under consideration and subject to change. This document does not constitute any official action by the Commission. However, the Chairman has determined that, in the interest of promoting the public's ability to understand the nature and scope of issues under consideration, the public interest would be served by making this document publicly available. The FCC's *ex parte* rules apply and presentations are subject to "permit-but-disclose" *ex parte* rules. See, e.g., 47 C.F.R. §§ 1.1206, 1.1200(a). Participants in this proceeding should familiarize themselves with the Commission's *ex parte* rules, including the general prohibition on presentations (written and oral) on matters listed on the Sunshine Agenda, which is typically released a week prior to the Commission's meeting. See 47 CFR §§ 1.1200(a), 1.1203.

V. ORDER ANNOUNCING PARTIAL LIFTING OF FREEZE 175

VI. PROCEDURAL MATTERS..... 177

VII.ORDERING CLAUSES..... 181

APPENDIX A – Final Rules

APPENDIX B – Final Regulatory Flexibility Analysis

APPENDIX C – List of Commenters

APPENDIX D – Spectrum Threshold Illustration

APPENDIX E – License Cancellations to Facilitate AAR License Modification

I. INTRODUCTION

1. Today we realign the 900 MHz band to make available six of the band's ten megahertz for the deployment of broadband services and technologies to meet the ever-increasing spectrum capacity demands of a wide range of industries, including utilities and railroads, and other private land mobile radio services. To effectuate this transition and create a broadband segment, we substantially rely on a negotiation-based mechanism that leverages the speed and efficiency of private agreements between interested parties with knowledge of the existing spectral and operational environment. We also recognize the need for continuity of narrowband operations, and therefore we retain four megahertz for such operations.

2. In this *Report and Order*, we create a regulatory framework for 900 MHz broadband licensing by establishing procedures for obtaining a broadband license and by adopting operational and technical rules to minimize harmful interference to narrowband operations. To further facilitate 900 MHz broadband opportunities while maintaining narrowband operations, we also issue an *Order of Proposed Modification* regarding the 900 MHz nationwide ribbon license held by the Association of American Railroads, and we announce a partial lifting of the 900 MHz application freeze to allow applications for relocation under certain conditions.

II. BACKGROUND

3. The 900 MHz band (896-901/935-940 MHz) currently is designated for narrowband land mobile radio communications by Business/Industrial/Land Transportation (B/ILT) Pool licensees and Specialized Mobile Radio (SMR) providers.¹ The band consists of 399 narrowband (12.5 kilohertz) frequency pairs grouped into 10-channel blocks that alternate between SMR blocks that are site-based or geographically licensed by Major Trading Area² and B/ILT blocks in which channels are assigned on a site-by-site basis.³

4. The 900 MHz band is situated immediately above spectrum that is divided between the commercial Air-Ground Radiotelephone Service, which uses the 894-896 MHz segment as the downlink for high-speed communications services to the public onboard aircraft,⁴ and common carrier and private fixed point-to-point links in the 932.5-935 MHz segment.⁵ The 900 MHz band is immediately below the Narrowband Personal Communications Service, which uses spectrum at 901-902/940-941 MHz, most commonly for two-way paging and telemetry, such as the monitoring of utility meters.⁶

¹ See 47 CFR § 2.106. The 900 MHz band is regulated under part 90 of the Commission's rules, entitled "Private Land Mobile Radio Services." See 47 CFR pt. 90.

² A Major Trading Area is a geographic area based upon the Rand McNally & Company (Rand McNally) 1992 Commercial Atlas & Marketing Guide, 123rd Edition, pages 38-39, used by the Commission to define coverage of spectrum licenses for certain services. For 900 MHz SMR licenses, the Commission uses 51 Major Trading Areas, which include the 47 established by Rand McNally, with the following exceptions and additions: Alaska is separated from the Seattle Major Trading Area and is licensed separately; Guam and the Northern Mariana Islands are licensed as a single area; Puerto Rico and the U.S. Virgin Islands are licensed as a single area; and American Samoa is licensed as a single area. 47 CFR § 90.7.

³ See 47 CFR §§ 90.613, 90.617(c), (f).

⁴ See *id.* pt. 22, subpart G. AC BidCo, LLC, a subsidiary of Gogo Inc., holds the nationwide licenses for the 894-896 MHz band.

⁵ See *id.* § 101.101.

⁶ See *id.* § 24.129.

5. B/ILT radio systems provide a communications network to support the day-to-day operations of a wide variety of businesses.⁷ Hundreds of entities hold 900 MHz B/ILT licenses, including many in the trucking, manufacturing, and oil and gas industries, to support their business operations.⁸ Utilities also hold a substantial number of 900 MHz B/ILT licenses. For example, Duke Energy, which provides electricity to customers in the Southeast region of the United States, is a large holder of 900 MHz B/ILT spectrum.⁹ Oncor is another substantial holder of 900 MHz B/ILT spectrum and provides electric utility services to more than 10 million customers across Texas.¹⁰ Florida Power and Light holds B/ILT spectrum in a number of regions throughout Florida.¹¹ Other examples of utilities operating a substantial number of 900 MHz B/ILT sites include Southern California Edison and Lower Colorado River Authority.¹² The Association of American Railroads holds a nationwide ribbon license surrounding railroad rights-of-way for six paired 12.5 kilohertz channels of the 900 MHz band.¹³

6. The primary use for SMR traditionally has been dispatch services to an SMR's end user customers, but the development of a digital SMR marketplace has allowed new features and services, such as internet access, two-way acknowledgment paging, inventory tracking, and fleet management.¹⁴

⁷ See *Amendment of Part 90 of the Commission's Rules to Provide for Flexible Use of the 896-901 MHz and 935-940 MHz Band Allotted to the Business and Industrial Land Transportation Pool*, WT Docket No. 05-62, WT Docket No. 02-55, Report and Order, 23 FCC Rcd 15856, 15858, para. 2 (2008). See Critical Infrastructure Coalition Comments at 2-4.

⁸ See, e.g., National Association of Manufacturers and MRFAC, Inc. Comments at 2-3.

⁹ See Duke Energy Comments at 4 (stating that Duke Energy "provid[es] electric and gas service to 7.5 million electric customers and 1.6 million gas customers in seven states—North Carolina, South Carolina, Indiana, Ohio, Kentucky, Florida, and Tennessee"); ULS Search for active licenses for Duke Energy in the 935-940 MHz frequency range (showing 48 licenses, including business trunked licenses (YU service code), other industrial/land transportation trunked licenses (YI service code), and other industrial/land transportation conventional licenses (GI service code)).

¹⁰ See Oncor Comments at 1 (stating that Oncor "operates the largest electric transmission and distribution system in Texas"); ULS Search for active licenses for Oncor in the 935-940 MHz frequency range (showing 67 other industrial/land transportation trunked licenses (YI service code)).

¹¹ See NextEra Energy, Inc. Comments at 2 (stating that Florida Power and Light is "the largest Florida electric utility"); ULS Search for active licenses for Florida Power and Light in the 935-940 MHz frequency range (showing 26 licenses, including other industrial/land transportation trunked licenses (YI service code) and other industrial/land conventional licenses (GI service code)).

¹² See Southern California Edison Comments at 1 (stating that Southern California Edison has 100 licenses in the 900 MHz band and provides service to most of the south-central region of California); ULS Search for active licenses for Southern California Edison in the 935-940 MHz frequency range (showing 26 licenses, including auctioned SMR licenses (YD service code), industrial/land transportation trunked licenses (YI service code), other industrial/land conventional licenses (GI service code), and business conventional licenses (GU service code)).

¹³ See FCC Call Sign WPSF894; *Petition of Association of American Railroads (AAR) for Modification of Licenses for Use in Advanced Train Control Systems and Positive Train Control Systems*, DA 01-359, Order, 16 FCC Rcd 3078, 3082, para. 10 (WTB PSPWD 2001) (*2001 AAR Modification Order*); see also *900 MHz NPRM*, 34 FCC Rcd at 1556, para. 16, n. 44. AAR holds a license for the following 900 MHz channel pairs: 896.8875/935.8875 MHz, 896.9375/935.9375 MHz, 896.9875/935.9875 MHz, 897.8875/936.8875 MHz, 897.9375/936.9375 MHz, and 897.9875/936.9875 MHz. AAR operates in the continental United States.

¹⁴ See *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services*, Eleventh Report, 21 FCC Rcd 10947, 10972-73, para. 64 (2006). To prevent SMR encroachment on Private Land Mobile Radio (PLMR) spectrum, the Commission initially prohibited SMR systems from being authorized on B/ILT channels, but it subsequently authorized B/ILT licensees to convert their PLMR licenses to commercial mobile radio service (CMRS) licenses or to assign their licenses to others for CMRS use. See *Amendment of Part 90 of the*

(continued....)

Anterix is the largest holder of 900 MHz SMR spectrum,¹⁵ with licenses in all Major Trading Areas except MTA-50 (Guam and the Northern Mariana Islands) and MTA-51 (American Samoa).¹⁶ In 95.4% of the 49 Major Trading Areas where it holds 900 MHz SMR spectrum, Anterix holds more than three megahertz of spectrum.¹⁷

7. According to Commission licensing records, many 900 MHz B/ILT and SMR systems have been in operation for decades, and the heaviest usage areas track many of the most populated areas in the country, covering much of the East Coast, east Texas, the coastal regions in California, as well as areas in and around Chicago, Denver, Kansas City, New Orleans, Salt Lake City, and Seattle. In contrast, 900 MHz spectrum is not heavily used in rural areas of certain states such as Arkansas, Iowa, Montana, Nebraska, New Mexico, North Dakota, and Wyoming.

8. 900 MHz licensees typically operate narrowband conventional or trunked networks that support two-way voice and data communications. Conventional radio systems typically allocate channels to a specific user or a group of users.¹⁸ The end users in the group can manually switch to an available channel or must wait for a channel to become available in order to start communicating. Trunked systems, on the other hand, combine multiple channels and implement a control channel, which automatically assigns available channels to end users, enabling larger groups of users to communicate over a network.¹⁹

9. While some 900 MHz licensees will continue to rely on narrowband deployments to satisfy a variety of communications needs,²⁰ many 900 MHz licensees, particularly utilities and other industrial users, will require additional coverage and capacity to keep pace with the expanding need for enhanced connectivity.²¹ Broadband is an effective tool for addressing many 900 MHz licensees' current

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Commission's Rules to Facilitate Future Development of SMR Systems in the 800 MHz Band, PR Docket No. 93-144, First Report and Order, Eighth Report and Order, and Second Further Notice of Proposed Rule Making, 11 FCC Rcd 1463, 1536, para. 141 (1995) (*800 MHz SMR Report and Order*); *Improving Public Safety Communications in the 800 MHz Band*, *et al.*, Report and Order, Fifth Report and Order, Fourth Memorandum Opinion and Order, and Order, 19 FCC Rcd 14969, 15127-28, paras. 335-37 (2004) (*800 MHz Public Safety Report and Order*); 47 CFR §§ 90.617(c), 90.621(f). 900 MHz SMR licensees have the flexibility to operate with a regulatory status classification of either CMRS or Private Mobile Radio Service (PMRS). 47 U.S.C. § 332.

¹⁵ See ULS Search for active licenses for Anterix in the 935-940 MHz frequency range (showing 1,507 licenses, including conventional SMR licenses (GR service code), trunked SMR licenses (YS service code), auctioned SMR licenses (YD service code), industrial/land transportation trunked licenses (YI service code), and business conventional licenses (GU service code)).

¹⁶ See ULS Market Based License Search by Major Trading Area for active licenses for Anterix in the 935-940 MHz band (showing 911 auctioned SMR licenses (YD service code)); *but see* ULS Market Based License Search by MTA-050 Guam-Northern Mariana Islands for Anterix in the 935-940 MHz frequency range (showing zero results) and ULS Market Based License Search by MTA-051 American Samoa for Anterix in the 935-940 MHz band (showing zero results).

¹⁷ In 90.8% of the 49 Major Trading Areas, Anterix holds three to six megahertz of 900 MHz spectrum; in 4.6% of the 49 Major Trading Areas, Anterix holds zero to three megahertz; and in the remaining 4.6% of the 49 Major Trading Areas, it holds six to nine megahertz.

¹⁸ 47 CFR § 90.7.

¹⁹ *Id.*

²⁰ See, e.g., American Petroleum Institute and the Energy Telecommunications and Electrical Association Comments at 2; City of Los Angeles Department of Water and Power Comments; Lower Colorado River Authority Reply; NextEra Energy, Inc. Comments.

²¹ See e.g., Anterix Comments; Enterprise Wireless Alliance Comments; Ericsson Comments at 2-3; Southern Company Services, Inc. Comments at 5.

and future needs, and it can offer next generation services not typically associated with narrowband systems—such as surveillance, advanced metering, many mission-critical applications, one-to-many push-to-talk, 4x2 multiple-input multiple-output, and evolved Multimedia Broadcast Multicast Services.²²

10. In 2017, the Commission released a *Notice of Inquiry* in this docket to examine whether rule changes may be appropriate to increase access to spectrum, improve spectrum efficiency, and expand flexibility in the 900 MHz band to serve users' current and future communications needs.²³ The *NOI* sought comment on several ideas, including reconfiguring the band to create a broadband service, as suggested by Anterix and the Enterprise Wireless Alliance (EWA).²⁴

11. In 2018, the Wireless Telecommunications Bureau suspended the acceptance of applications for new or expanded 900 MHz operations in order to maintain a stable spectral landscape while the Commission determined how to proceed with respect to that spectrum.²⁵

12. On March 14, 2019, the Commission released a *Notice of Proposed Rulemaking*, which proposed to realign the 900 MHz band to enable broadband deployment.²⁶ The *NPRM* sought comment generally on how to realign the band, how to conduct a transition, and on what technical rules are needed to make the realignment a reality.²⁷ The Commission proposed to realign the 900 MHz band to create a broadband segment and to reserve the remainder of the 900 MHz band for continued narrowband

²² See, e.g., Ericsson Comments at 2-3; Enterprise Wireless Alliance Comments; Motorola Solutions, Inc. Comments at 1, 3; National Rural Electric Cooperative Association Reply; New York Power Authority Comments; Southern Company Services, Inc. Reply; Wireless Infrastructure Reply.

²³ See *Review of the Commission's Rules Governing the 896-901/935-940 MHz Band; Realignment of the 896-901/935-940 MHz Band to Create a Private Enterprise Broadband Allocation; Amendment of the Commission's Rules to Allow for Specialized Mobile Radio Services Over 900 MHz Business/Industrial Land Transportation Frequencies*, WT Docket No. 17-200, Notice of Inquiry, 32 FCC Rcd 6421, 6421, para. 1 (2017) (*NOI*).

²⁴ See *id.* at 6430-32, paras. 26, 40. Petition for Rulemaking of the Enterprise Wireless Alliance and Pacific DataVision, Inc., RM-11738 (filed Nov. 17, 2014), <https://www.fcc.gov/ecfs/filing/60000983985> (EWA/Anterix Petition); *Ex Parte* Comments, Proposed 900 MHz PEBB Allocation Rules, RM-11738 (filed May 4, 2015), <https://www.fcc.gov/ecfs/filing/60001030774> (EWA/Anterix Proposed Rules); Enterprise Wireless Alliance and pdvWireless, Inc. Comments, WT Docket No. 17-200 (filed May 1, 2018), <https://www.fcc.gov/ecfs/filing/10501075523973> (modifying the EWA/Anterix Petition after issuance of the *NOI*). EWA, a part 90 PLMR frequency coordinator for 900 MHz and other PLMR channels, is an organization that represents many 900 MHz band licensees. See EWA/Anterix Petition at 12. Anterix was known as Pacific DataVision and as pdvWireless. For clarity and consistency, we refer to the company and its filings made in relation to the *NPRM* by its current name, Anterix. The *NOI* also sought comment on a proposal by M2M Spectrum Networks, Inc. (M2M) to allow SMR systems on B/ILT channels. *NOI*, 32 FCC Rcd at 6428-30, paras. 19-25; see Petition for Rulemaking of M2M Spectrum Networks, LLC, RM-11755 (filed June 29, 2015), <http://appsint.fcc.gov/ecfs/document/view?id=60001108411>. M2M subsequently shifted its support to Anterix and EWA's proposal for 900 MHz band realignment rather than its own initial proposal. See M2M Spectrum Networks, LLC Comments, WT Docket No. 17-200, at 2-3.

²⁵ See *Wireless Telecommunications Bureau Announces Temporary Filing Freeze on the Acceptance of Certain Part 90 Applications for 896-901/935-940 MHz (900 MHz Band) Spectrum*, WT Docket No. 17-200, Public Notice, 33 FCC Rcd 8735, 8735-36 (WTB 2018) (*900 MHz Freeze Public Notice*). In October 2019, the Wireless Telecommunications Bureau modified the terms of the 900 MHz application freeze. See *Review of the Commission's Rules Governing the 896-901/935-940 MHz Band*, WT Docket No. 17-200, Order, 34 FCC Rcd 9369 (WTB 2019).

²⁶ *Review of the Commission's Rules Governing the 896-901/935-940 MHz Band*, WT Docket No. 17-200, Notice of Proposed Rulemaking, 34 FCC Rcd 1550, 1550-51, para. 1 (2019) (*900 MHz NPRM* or *NPRM*).

²⁷ *Id.* at 1553-77, paras. 7-76.

operations, and it sought comment on ways to balance these objectives most effectively.²⁸ The Commission proposed paired three megahertz blocks as the most appropriate segment size for a viable 900 MHz broadband service, and it further proposed paired 1.5 and .5 megahertz blocks as sufficient spectrum for 900 MHz narrowband operations.²⁹ The *NPRM* sought comment on the need for broadband capacity and on whether the proposed realignment would help meet current and future broadband needs while preserving incumbent uses in the narrowband segments.³⁰ The Commission proposed placing the 1.5/1.5 megahertz narrowband segment on the lower side of the 900 MHz band to reduce the impact of realignment on 900 MHz band channels assigned throughout the country to the railroad industry for advanced train control systems, and it sought comment on its proposed location of the broadband segment.³¹ The Commission anticipated that its proposed arrangement would provide 1.5 megahertz of separation between the broadband segment and the 894-896 MHz Air-Ground Radiotelephone Service/932-935 MHz fixed microwave systems spectrum, and 500 kilohertz of separation between the broadband segment and the 901-902/940-941 MHz Narrowband Personal Communications Service spectrum.³² The proposed placement of the broadband segment would not split any of the geographic SMR license blocks between the broadband spectrum and narrowband spectrum, which would potentially complicate band realignment.³³ In addition, the Commission noted that separate narrowband segments, rather than a single 2/2 megahertz segment, would allow greater flexibility in frequency selection for narrowband licensees to provide adequate space between co-located channels.³⁴ The *NPRM* also sought comment on alternative approaches, such as realigning the entire band to create a 5/5 megahertz broadband channel or creating a 1.4/1.4 megahertz broadband channel with larger protection bands between broadband and narrowband operations.³⁵ Consistent with its approach in several other bands used to provide fixed and mobile services, the Commission proposed to license the broadband segment on a geographic area basis and sought comment on whether broadband licenses should be issued on a county-by-county basis or over a larger geography.³⁶

13. To provide additional flexibility for the deployment of broadband services in the 900 MHz band and consistent with the allocations in the 890-902 MHz and 928-942 MHz bands in Region 2 of the International Table of Frequency Allocations,³⁷ the Commission proposed to replace the Land Mobile Service allocation in the 900 MHz band with a Mobile Except Aeronautical Mobile Service allocation on a co-primary basis with the Fixed Service. The Commission explained that this proposed framework would satisfy the requirements for the allocation of flexible use spectrum under section 303(y) of the Communications Act, including consistency with international spectrum allocations, and would spur innovation and investment in new wireless technologies while not causing harmful interference.³⁸

²⁸ *Id.* at 1553-54, 1559-60, paras. 9, 11, 25, 26.

²⁹ *Id.* at 1554, para. 11.

³⁰ *Id.* at 1554-55, paras. 11-12.

³¹ *Id.* at 1555-56, paras. 15-16.

³² *Id.* at 1555-56, para. 15.

³³ *Id.* at 1556, para. 16.

³⁴ *Id.* at 1556, para. 16.

³⁵ *Id.* at 1557, para. 20.

³⁶ *Id.* at 1558-59, paras. 21-23.

³⁷ *Id.* at 1555, para. 13.

³⁸ *Id.* at 1555, para. 14.

14. The Commission recognized that a realignment of the 900 MHz band presents particular challenges given the unique spectrum characteristics, varied incumbent uses, and intensity of use in particular geographic areas.³⁹ In light of these challenges, it proposed to authorize a market-driven, voluntary exchange process to effectuate a transition to broadband, and it sought comment on alternatives to be used in combination with a voluntary exchange process, such as an auction of overlay licenses or an incentive auction.⁴⁰ In proposing a voluntary realignment, the Commission recognized its statutory obligation to license spectrum in the public interest and sought comment on how its authority should be applied to address the licensing of 900 MHz broadband services.⁴¹ It proposed certain eligibility restrictions for an applicant to qualify for a new paired three megahertz broadband license, while seeking comment on further restrictions that may be necessary to ensure an efficient and complete transition process and to minimize the amount of spectrum the Commission must grant from its inventory to create the broadband segment.⁴² For example, the Commission proposed a regime in which a prospective 900 MHz broadband licensee would be required to acquire, relocate, or provide interference protection to, “covered incumbents” in the county where it seeks a new broadband license.⁴³ Accordingly, it sought comment on the definition of “covered incumbent” for negotiation and relocation purposes.⁴⁴ The Commission also sought comment on whether anti-windfall provisions might be appropriate where the voluntary exchange substantially increases the prospective broadband licensee’s spectrum value.⁴⁵

15. Recognizing that the voluntary exchange process may result in holdout problems, the *NPRM* sought comment on additional requirements that may be needed to ensure an effective transition.⁴⁶ For example, the Commission sought comment on whether to require a mandatory relocation component and asked whether exceptions to mandatory relocation may be warranted.⁴⁷ The Commission also sought comment on procedures governing the transition, including a framework for compensating relocated incumbents and a timeframe for mandatory relocation.⁴⁸ To ensure an effective transition process, the Commission proposed and sought comment on requirements for an application seeking a 900 MHz broadband license, including whether to lift the freeze on B/ILT applications to allow incumbents to file applications necessary to effectuate relocation.⁴⁹

16. The *NPRM* also sought comment on licensing and operating rules for licenses in the band.⁵⁰ The Commission proposed a 15-year initial license term and sought comment on whether shorter terms for renewal would be appropriate, given that relocation, band clearance, and initial performance requirements already will have been satisfied upon renewal of a given 900 MHz broadband license.⁵¹ To ensure that licensed spectrum does not lie fallow, the Commission sought comment on performance and

³⁹ *Id.* at 1559, para. 24.

⁴⁰ *Id.* at 1559, 1565-69, paras. 25, 41-55.

⁴¹ *Id.* at 1560, para. 26.

⁴² *Id.* at 1560-63, paras. 28-34.

⁴³ *Id.* at 1562, para. 32.

⁴⁴ *Id.* at 1562, para. 33.

⁴⁵ *Id.* at 1562-63, paras. 32-34.

⁴⁶ *Id.* at 1564, paras. 37-38.

⁴⁷ *Id.* at 1564, para. 38.

⁴⁸ *Id.* at 1564-65, paras. 39-40.

⁴⁹ *Id.* at 1563-64, paras. 35-38.

⁵⁰ *Id.* at 1569-75, paras. 56-69.

⁵¹ *Id.* at 1570-71, para. 59.

buildout requirements for the proposed broadband segment, potential alternatives, and penalties to ensure timely buildout.⁵² To achieve its policy goals of reconfiguring the 900 MHz band specifically to enable broadband operations, the Commission proposed to require 900 MHz broadband licensees to deploy broadband technologies and to offer broadband services in satisfying the proposed performance requirements, and it sought comment on how to define broadband services for purposes of this obligation.⁵³ The Commission sought to ensure that its rules were flexible enough to enable a wide variety of services, while also providing sufficient protection to licensees in adjacent narrowband spectrum and to licensees in the broadband segment in adjacent areas.⁵⁴ In light of these considerations, the *NPRM* proposed technical rules and sought comment on whether the rules were flexible enough to balance these objectives.⁵⁵

17. Commenters generally recognize the pressing need for 900 MHz narrowband licensees to have access to broadband.⁵⁶ For example, the American Petroleum Institute and the Energy Telecommunications and Electrical Association agree there is a shortage of available broadband spectrum, especially for high-speed data applications.⁵⁷ Several commenters, including Ameren and Duke Energy, explain that broadband solutions in the 900 MHz band are key to improving network efficiency and meeting changing customer needs.⁵⁸ Ameren asserts that broadband is the solution to managing a changing power distribution model, addressing a growing influx of data, and preventing cyber and physical damage to networks.⁵⁹ As one of the largest electrical utilities in the country, Southern California Edison claims that the need for broadband capacity is “multiplied exponentially when satisfying both the standard of near-perfect reliability in critical systems and the nature and size of the various loads that the utility telecom network will be required to provision and sustain.”⁶⁰

18. Many commenters support a solely voluntary exchange process,⁶¹ which they argue will be faster and more efficient than any other approach, in part because the negotiation process will allow

⁵² *Id.* at 1571-73, paras. 60-65.

⁵³ *Id.* at 1572, para. 62.

⁵⁴ *Id.* at 1575-77, paras. 70-76.

⁵⁵ *Id.* at 1575-77, paras. 70-76.

⁵⁶ *See, e.g.*, Ameren Comments; American Petroleum Institute and the Energy Telecommunications and Electrical Association Comments; Anterix Comments; Duke Energy Comments; Enterprise Wireless Alliance Comments; Ericsson Comments; General Electric Renewables Reply; Hawaiian Electric Companies Comments; Motorola Solutions, Inc. Comments; National Rural Electric Cooperative Association Reply; New York Power Authority Reply; Sonim Comments; Southern California Edison Comments; Southern Company Services, Inc. Comments; United Parcel Service (UPS) Comments; Utilities Technology Council Comments; Utilities Technology Council Reply; Wireless Infrastructure Association Reply.

⁵⁷ American Petroleum Institute and the Energy Telecommunications and Electrical Association Comments at 2.

⁵⁸ *See, e.g.*, Ameren Comments at 2-4; American Petroleum Institute and the Energy Telecommunications and Electrical Association Comments; Anterix Comments at 3-7; Duke Energy Comments; Enterprise Wireless Alliance Comments; Hawaiian Electric Companies Comments; Southern California Edison Comments; Southern Company Services, Inc. Comments.

⁵⁹ Ameren Comments at 2.

⁶⁰ Southern California Edison Comments at 5.

⁶¹ *See, e.g.*, American Petroleum Institute and the Energy Telecommunications and Electrical Association Comments; Lower Colorado River Authority Comments; Lower Colorado River Authority Reply; Letter from Kevin M. Cookler, Counsel to Lower Colorado River Authority, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200 (filed Aug. 19, 2019) (Lower Colorado River Authority Aug. 19, 2019 *Ex Parte*); Letter from Bryan N. Tramont, Counsel to NextEra Energy, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200 (filed Jan. 31, 2019) (continued....)

incumbents and prospective broadband licensees to reach agreements that best satisfy each party's respective needs.⁶² Southern Company agrees that "a market-driven, voluntary approach based on private agreements can bring speed and efficiency to the realignment process."⁶³ UPS maintains that "[e]ven with a one year voluntary negotiation period, followed by dispute resolution if necessary, the rebanding is likely to be completed faster and more efficiently than through an auction process."⁶⁴ Several commenters caution that a fully voluntary exchange process will result in holdouts when incumbents and prospective broadband licensees cannot agree on terms for clearing the market.⁶⁵ For instance, Anterix anticipates that holdouts may result "when an incumbent either will not engage in the negotiation process at all or demands compensation entirely disproportionate to the cost of realignment or any reasonable reflection of the value of its spectrum holdings."⁶⁶ These commenters argue that some type of mandatory relocation must follow a voluntary exchange process to address holdouts and to effectuate a more complete broadband transition.⁶⁷ Ameren urges the Commission to adopt a success-based threshold as a backstop.⁶⁸

19. Certain incumbent utility licensees urge the Commission to prohibit broadband operations from being introduced in the 900 MHz band or to adopt interference protections or exemptions from mandatory relocation to preserve their systems.⁶⁹ The Critical Infrastructure Coalition opposes the Commission's proposal to create a new broadband segment, arguing that "it would disrupt critical infrastructure communications in the band [and] the dangers associated with the proposal outweigh the benefits."⁷⁰ Some commenters express concern with any mandatory relocation of their large, complex

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2020) (NextEra Jan. 31, 2020 *Ex Parte*); Motorola Solutions, Inc. Comments; Utilities Technology Council Comments; Utilities Technology Council Reply.

⁶² Anterix Comments at 13; Enterprise Wireless Alliance Comments at 7; Southern Company Services, Inc. Comments at 7; UPS Comments at 12-13.

⁶³ Southern Company Services, Inc. Comments at 7.

⁶⁴ UPS Comments at 14.

⁶⁵ See, e.g., Ameren Comments; Anterix Comments at 14-17; Enterprise Wireless Alliance Comments at 7; Ericsson Comments at 4; Southern Company Services, Inc. Comments at 7; Southern Company Services, Inc. Reply at 8; UPS Comments at 14; UPS Reply at 6.

⁶⁶ Anterix Comments at 13; see also Enterprise Wireless Alliance Comments at 7 (agreeing with Anterix's concerns regarding potential holdouts).

⁶⁷ See, e.g., Ameren Comments at 5; American Petroleum Institute and the Energy Telecommunications and Electrical Association Comments at 5; Anterix Comments at 14-17; Anterix Reply at 8-9; Enterprise Wireless Alliance Comments at 7; Enterprise Wireless Alliance Reply at 3; Ericsson Comments at 4; Hawaiian Electric Companies Comments at 7-8; Southern California Edison Reply at 5; Southern Company Services, Inc. Comments at 7; Southern Company Services, Inc. Reply at 8; UPS Comments at 14; UPS Reply at 6.

⁶⁸ Ameren Comments at 6.

⁶⁹ See, e.g., City of Los Angeles Department of Water and Power Comments; Critical Infrastructure Coalition Comments; Duke Energy Comments; Ericsson Comments at 4; NextEra Energy, Inc. Comments; UPS Comments; Letter from Suzanne Lemieux, Manager, Operations Security & Emergency Response, American Petroleum Institute and the Energy Telecommunications and Electrical Association, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200 (filed March 11, 2020) (American Petroleum Institute March 11, 2020 *Ex Parte*) (urging Anterix to produce interference studies, detailed transition plans, or remediation plans to alleviate concerns among narrowband operators). But see Letter from Elizabeth R. Sachs, Counsel to Anterix, Inc., to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200 (filed March 16, 2020) (stating Anterix has provided studies demonstrating non-interference from broadband to narrowband systems and explaining that Anterix and API have had extensive exchanges on these and related matters).

⁷⁰ Critical Infrastructure Coalition Comments at 3.

systems and therefore favor continued narrowband operations with no transition or, at a minimum, an exemption from mandatory relocation for complex systems.⁷¹ The City of Los Angeles Department of Water and Power claims that incumbents will bear the burden of accommodating a new broadband service, whether in the form of direct interference or the costs of the realignment itself.⁷²

III. REPORT AND ORDER

20. Today we create a 900 MHz broadband segment to enable new broadband deployment that can provide enhanced spectrum capacity to meet the needs of a wide variety of entities, such as electric, oil and gas, and water management utilities and transportation companies. To facilitate a rapid transition, we adopt a negotiation-based mechanism which, if private agreements are reached, will make available on a county-by-county basis six megahertz of low-band spectrum for the development of broadband technologies and services, while reserving the remaining four megahertz of the band for continued narrowband operations.

21. We realign the 900 MHz band to enable a broadband transition from interleaved SMR and B/ILT blocks to one broadband segment and two narrowband segments. If negotiations for the acquisition, relocation, and protection of 900 MHz incumbents in a market are successful and granting an application is otherwise in the public interest, we will issue new initial licenses to applicants meeting eligibility requirements. A 900 MHz broadband licensee will be permitted to relocate mandatorily a limited percentage of covered incumbents—except those with complex systems—from the new broadband segment to the narrowband segment by paying reasonable relocation costs, including providing comparable facilities. We also propose to modify the 900 MHz license held by the Association of American Railroads to prevent disruption to the railways, enhance rail safety, and fully clear a virtually nationwide incumbent from the newly designated broadband segment. In this *Report and Order*, we also address license application requirements, anti-windfall payment obligations, transition procedures, operating rules, and technical rules applicable to the new 900 MHz broadband license.

A. Transition of 900 MHz Band to Enable Broadband Deployment

22. Broadband deployment in the 900 MHz band is necessary and useful for continued growth of many of our nation's industries, as current narrowband solutions are not able to support advanced connectivity needs. Licensees in the 900 MHz band lack access in that band to wireless broadband given the current narrowband spectrum configuration, and traditional commercial broadband networks may not be available in desired areas or, if available, may not be suited for mission-critical applications.

23. With this *Report and Order*, we provide a variety of 900 MHz users a new opportunity to leverage broadband capacity for more robust communication networks, especially for industries that provide crucial services to the American public. The record demonstrates that there is an ever-growing need by utilities and other industries for increased access to reliable broadband services.⁷³ For example,

⁷¹ See, e.g., City of Los Angeles Department of Water and Power Comments; Critical Infrastructure Coalition Comments; Duke Energy Comments; Letter from C. Douglas Jarrett, Counsel to Ad Hoc Refiners Group, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200 (filed Feb. 25, 2020) (Ad Hoc Refiners Feb. 25, 2020 *Ex Parte*) (opposing mandatory relocation of narrowband systems in major metropolitan areas); NextEra Energy, Inc. Comments; NextEra Energy, Inc. Reply; NextEra Energy Jan. 31, 2020 *Ex Parte*.

⁷² See City of Los Angeles Department of Water and Power Comments at 3-5; see also American Petroleum Institute and the Energy Telecommunications and Electrical Association Comments at 3; Critical Infrastructure Coalition Comments; Duke Energy Comments.

⁷³ See Ameren Comments at 1, 2, 4; American Petroleum Institute and the Energy Telecommunications and Electrical Association Comments at 2; Anterix Comments at 2, 4-7; Anterix Reply at 1-4; Azetti Networks Comments at 1; Council Rock Comments at 1; Duke Energy Comments at 1-4; Encore Networks, Inc. Comments at 1; Enterprise Wireless Alliance Comments at 1, 4; Ericsson Comments at 2-3; Letter from Evergy Inc., to Marlene

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National Rural Electric Cooperative Association comments that broadband spectrum is needed to deploy smart grid technologies in rural areas in order “to remotely monitor and control substation and field stations” and to provide protection “to guard against potentially hazardous faults.”⁷⁴ Ameren claims that broadband is needed to meet evolving consumer needs, for instance, by introducing innovative “products and services that give customers greater control over their energy usage.”⁷⁵ New York Power Authority contends that broadband will enable advances in “its operational and programmatic capabilities” and will allow it to “leverage the benefits of evolving innovation in wireless equipment,” in the areas of drone technology, Wi-Fi telephony, and Internet of Things applications.⁷⁶ Commenters argue that many of these entities currently lack access to the broadband capacity required for advanced services and applications.⁷⁷ As Flint Hills explains, commercial wireless coverage is “not available throughout the refineries and third-party networks are not appropriate for transmitting highly sensitive information.”⁷⁸ Southern Company similarly asserts that commercial broadband service providers generally cannot meet the levels of coverage, capacity, reliability, and security required by utilities, and that they are unable to provide the dedicated capacity needed for data-intensive, low latency applications and uses.⁷⁹

24. We find that enabling broadband deployment in the 900 MHz band will unlock new possibilities for 900 MHz licensees and allow utilities to operate their networks more effectively and reliably. A wide variety of commenters—including utilities and other industrial entities, trade associations, and equipment manufacturers and vendors—support Commission action to make 900 MHz spectrum available for new broadband use.⁸⁰ As Ameren explains, a modernized energy grid requires “a

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H. Dortch, Secretary, FCC, WT Docket No. 17-200, at 1 (filed June 24, 2019) (Evergy *Ex Parte*); Letter from Brooke A. Vickery, Vice-President and Manufacturing Manager, Flint Hills Resources, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200, at 1 (filed June 12, 2019) (Flint Hills *Ex Parte*); General Electric Renewables Reply at 1; Hawaiian Electric Companies Comments at 3; Letter from Michael Oldak, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200, at 1 (filed May 30, 2019) (Oldak *Ex Parte*); Mission Critical Partners, Inc. Comments at 1-2; Motorola Solutions, Inc. Comments at 1, 3; Multi-Tech Systems, Inc. Comments at 1; National Rural Electric Cooperative Association Reply at 1; New York Power Authority Comments at 2; Sensus Comments at 3; Sonim Comments at 1; Southern California Edison Comments at 3, 5-6; Southern California Edison Reply at 1-2; Southern Company Services, Inc. Comments at 4-5; Southern Company Services, Inc. Reply at 2; Tait Communications Comments at 1; UPS Comments at 2; UPS Reply at 2; Utilities Technology Council Comments at 1-2; Utilities Technology Council Reply at 2; Virtual Network Communications, Inc. Comments at 1.

⁷⁴ National Rural Electric Cooperative Association Comments at 2.

⁷⁵ Ameren Comments at 2.

⁷⁶ New York Power Authority Comments at 1.

⁷⁷ Ameren Comments at 2; Anterix Comments at 4-5; Anterix Reply at 1-4; Duke Energy Comments at 2-3; Enterprise Wireless Alliance Comments at 2; Ericsson Comments at 1-2; Flint Hills *Ex Parte*; General Electric Renewables Reply at 1; Mission Critical Partners, Inc. Comments at 1; Multi-Tech Systems, Inc. Comments at 1; National Rural Electric Cooperative Association Reply at 2; Southern California Edison Comments at 5-6; Southern California Edison Reply at 1; Southern Company Services, Inc. Reply at 1-4; Utilities Technology Council Comments at 3-4, 9.

⁷⁸ Flint Hills Comments at 1.

⁷⁹ See Southern Company Services, Inc. Comments at 5.

⁸⁰ See Ameren Comments at 1-2, 4; American Petroleum Institute and the Energy Telecommunications and Electrical Association Comments at 2; Anterix Comments at 2, 4-7; Anterix Reply at 1-4; Azetti Networks Comments at 1; Council Rock Comments at 1; Critical Response Systems Comments at 1; Duke Energy Comments at 1-4; Encore Networks, Inc. Comments at 1; Enterprise Wireless Alliance Comments at 1, 4; Ericsson Comments at 2-3; Evergy *Ex Parte*; Flint Hills *Ex Parte*; General Electric Renewables Reply at 1; Hawaiian Electric Companies Comments at 3; Oldak *Ex Parte*; Mission Critical Partners, Inc. Comments at 1-2; Motorola Solutions, Inc. Comments at 1, 3; Multi-Tech Systems, Inc. Comments at 1; National Rural Electric Cooperative Association

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smarter, stronger and more secure communications network with far greater bandwidth,” to ensure that its operations are resilient.⁸¹ Broadband will enable electric utilities especially to modernize their operations, such as by installing smart grid systems and using dedicated broadband spectrum to improve their coverage, latency, and throughput.⁸² Duke Energy comments that a private broadband LTE network will allow it to monitor, manage, and control its modernized energy generation and delivery systems.⁸³ Ericsson maintains that broadband will allow oil and gas industries to provide enhanced communications using handheld devices and cameras “for improved safety and reliability of equipment and processes,” while other entities may use the broadband network to provide applications such as Voice over LTE, Narrowband-IoT, and Mission Critical Push-To-Talk over LTE.⁸⁴ Southern California Edison explains that broadband visual and data monitoring of electrical facilities in remote locations is “critical to mitigate electric infrastructure risk and ensure fire events are detected immediately and extinguished before they cause grow into major public safety events.”⁸⁵ Also, Southern California Edison observes that businesses need wireless capacity that can accommodate a variety of applications to secure their operations against cyber security threats and natural disasters.⁸⁶

25. The 900 MHz band is particularly well-suited for industrial broadband opportunities, given its distinct technical characteristics.⁸⁷ Specifically, the 900 MHz band is low-band spectrum, which is characterized by superior penetration and propagation characteristics and typically is associated with network reliability and reduced infrastructure costs.⁸⁸ Realigning the 900 MHz band for broadband uses will enable licensees to leverage the distinct features of this band and enhance their operations to provide next-generation services. In addition, broadband-capable equipment already is available in the 900 MHz band. Ameren has used 900 MHz LTE equipment as part of its experimental license pilot project,⁸⁹ and Ericsson noted that 900 MHz broadband will allow entities to draw on “economies of scale globally to provide equipment” for 900 MHz broadband.⁹⁰

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Reply at 1; New York Power Authority Reply at 2; Sensus Comments at 3; Sonim Comments at 1; Southern California Edison Comments at 3, 5-6; Southern California Edison Reply at 1-2; Southern Company Services, Inc. Comments at 4-5; Southern Company Services, Inc. Reply at 2; Tait Communications Comments at 1; UPS Comments at 2; UPS Reply at 2; Utilities Technology Council Comments at 1-2; Utilities Technology Council Reply at 2; Virtual Network Communications, Inc. Comments at 1; Wireless Infrastructure Association Reply at 1.

⁸¹ Ameren Comments at 2.

⁸² Ameren Comments at 1, 2; Anterix Comments at 2; Duke Energy Comments at 7; Ericsson Comments at 1-3; General Electric Renewables Reply at 1; National Rural Electric Cooperative Association Reply at 2; New York Power Authority Comments at 1; Southern California Edison Comments at 8; Utilities Technology Council Comments at 3-4; Utilities Technology Council Comments at 5.

⁸³ Duke Energy Comments at 2.

⁸⁴ Ericsson Comments at 2-3.

⁸⁵ Southern California Edison Comments at 2. The Hawaiian Electric Companies also state that having access to dedicated broadband communications capacity would allow it to address “ever more sophisticated cybersecurity threats” and fulfill its mission critical needs. *See* Hawaiian Electric Companies Comments at 1.

⁸⁶ Southern California Edison Comments at 2.

⁸⁷ Ameren Comments at 2, 4; Ericsson Comments at 3.

⁸⁸ Ameren Comments at 2, 4; Ericsson Comments at 3.

⁸⁹ Ameren Comments at 4.

⁹⁰ *See* Ericsson Comments at 3 (“[T]his low-band spectrum is ideal for LTE because of its propagation characteristics, and because the band overlaps the 3GPP Band 8 standard/the GSM 900 band, it is therefore expected to take advantage of international harmonization and economies of scale globally to provide equipment—meaning quicker deployments and cheaper equipment and devices.”); *see also* Southern California Edison Comments at 5-6.

26. We agree with commenters on the importance of creating a broadband segment in the band and find a broadband licensee will be able to deploy quickly and cost-effectively where a transition in a market is complete.

1. Band Realignment to Create a 3/3 Megahertz Broadband Segment

27. We find it in the public interest to create a broadband segment consisting of paired three megahertz channels (3/3 megahertz). Given the ten megahertz allocated in the 900 MHz band, we find that establishing a 3/3 megahertz broadband segment balances the operational requirements of both broadband and narrowband users.

28. A 3/3 megahertz broadband segment size allows us to open the 900 MHz band for expanded uses that will facilitate increased efficiency and encourage innovation for utilities and other industrial users. Specifically, paired three megahertz blocks are supported by wireless technical standards, such as Long Term Evolution (LTE),⁹¹ and these standards are sufficient to facilitate the services and applications, such as broadband data, voice services, text messaging, push-to-talk, and the capability to handle communications from massive numbers of small Internet of Things (IoT) devices like sensors and actuators. In addition, with a 3/3 megahertz broadband segment, 900 MHz licensees can exploit commercially available equipment and existing infrastructure, thereby reducing costs and allowing consumer savings.⁹² A 3/3 megahertz segment is sufficient for a viable 900 MHz broadband service and, given the total of ten megahertz in the band, enables us to retain significant spectrum for continued narrowband uses. The Utilities Technology Council agrees that “a 3/3 MHz broadband segment is the most appropriate size at this time in order to accommodate utilities’ increasing capacity requirements while at the same time preserving spectrum for narrowband utility communications needs.”⁹³ As Ericsson explains, “the LTE standard . . . support[s] a 3 MHz FDD channel bandwidth,” which it claims is “sufficient for a multitude of services on the same network platform, such as broadband data, voice services, text messaging, [and] push to talk.”⁹⁴ While a 3/3 megahertz broadband segment is less than what the Commission has designated for other flexible-use broadband services,⁹⁵ the record suggests that a likely primary use of 900 MHz broadband service would be to expand access to utilities and other

⁹¹ LTE is a global standard for wireless communication of high-speed data for mobile phones and data terminals. The current LTE specification defines 1.4, 3, 5, 10, 15, and 20 megahertz allocations for LTE. *See* Overview of 3GPP Release 8 V0.3.3 (2014-09), at 37-38. Industry standards for LTE are developed by the 3rd Generation Partnership Project (3GPP), an international partnership of industry-based telecommunications standards bodies that, among other things, establishes standards for different LTE band classes. *See* ABOUT 3GPP, <http://www.3gpp.org/about-3gpp> (last visited Jan. 8, 2020). 900 MHz band spectrum is within 3GPP Band Classes 8 and 81, which have been identified for provision of 5G services. *See* 3GPP Release 16: TS 38.101-1 V16.0.0 at 19 (2019-06).

⁹² *See, e.g.*, American Petroleum Institute and Energy Telecommunications and Electrical Association Comments at 2; Ericsson Comments at 3; Hawaiian Electric Companies Comments at 3; Southern California Edison Comments at 6; Southern Company Services, Inc. Comments at 1.

⁹³ Utilities Technology Council Comments at 5.

⁹⁴ Ericsson Comments at 5.

⁹⁵ For example, the bandwidth per license ranges from 5 megahertz to 20 megahertz for Advanced Wireless Services (AWS-3) licenses (Federal Communications Commission, *Auction 97: Advanced Wireless Services (AWS-3)*, <https://www.fcc.gov/auction/97/factsheet> (last visited Mar. 25, 2020)), from 6 megahertz to 12 megahertz for 700 MHz licenses (Federal Communications Commission, *Auction 92: 700 MHz Band*, <https://www.fcc.gov/auction/92/factsheet> (last visited Mar. 25, 2020); Federal Communications Commission, *Auction 73: 700 MHz Band*, <https://www.fcc.gov/auction/73/factsheet> (last visited Mar. 25, 2020)), and from 10 megahertz to 30 megahertz for broadband PCS licenses (Federal Communications Commission, *Auction 71: Broadband PCS*, <https://www.fcc.gov/auction/71/factsheet> (last visited Mar. 25, 2020)).

industrial entities.⁹⁶ Southern California Edison explains that the “specialized needs of the electric utility industry require the availability of significant dedicated capacity” that a realigned 900 MHz band is suited to deliver.⁹⁷ As stated in the *NPRM*, “900 MHz broadband licensees may be better positioned to focus on business, enterprise, and government customers whose needs are not being met by the consumer-driven, nationwide, 4G service offerings.”⁹⁸

29. Some commenters oppose realigning the 900 MHz band to accommodate a broadband segment to the extent that it would disrupt current narrowband operations in the 900 MHz band.⁹⁹ None of these commenters disagree that increased part 90 user access to broadband would serve the public interest, however, provided we accommodate existing narrowband operations.¹⁰⁰ These entities’ primary concern is that their large, complicated, spectrum-intensive systems will be required to relocate to spectrum that they claim cannot accommodate their operations.¹⁰¹ In addition, Duke Energy, Lower Colorado River Authority, and NextEra Energy express concern that the band configuration could require closer spacing of neighboring channels, which can increase the potential for co-channel and cross channel interference from adjacent channels.¹⁰² We understand these commenters’ concerns and agree that any transition to a broadband segment should not disrupt or harm incumbent uses of the 900 MHz band. We address the commenters’ particular concerns below.

30. We also reject the argument of some commenters that a band transition is unwarranted because a 3/3 megahertz broadband segment is too small to be useful¹⁰³ and will “have relatively limited

⁹⁶ 900 MHz *NPRM*, 34 FCC Rcd at 1554-55, para. 12; *see, e.g.*, Anterix Comments at 1; Southern California Edison Comments at 10; Southern Company Services, Inc. Comments at 1.

⁹⁷ Southern California Edison Comments at 3.

⁹⁸ 900 MHz *NPRM*, 34 FCC Rcd at 1554-55, para. 12; *see, e.g.*, Anterix Comments at 4-5; Association of American Railroads Comments at 8-9; Enterprise Wireless Alliance Comments at 2; National Rural Electric Cooperative Association Comments at n.3; Southern California Edison Comments at 10; Southern California Edison Comments at 10; Southern Company Services, Inc. Comments at 5; Utilities Technology Council Comments at 3.

⁹⁹ *See* City of Los Angeles Department of Water and Power Comments; City of Los Angeles Department of Water and Power Reply; Critical Infrastructure Coalition Comments; FirstEnergy Corp. Comments; Jackson Electric Membership Corporation Reply; JVCKENWOOD USA Corporation Comments; Lower Colorado River Authority Comments; Lower Colorado River Authority Reply; Lower Colorado River Authority Aug. 19, 2019 *Ex Parte*; NextEra Energy, Inc. Comments; NextEra Energy, Inc. Reply; Ad Hoc Refiners Feb. 25, 2020 *Ex Parte*.

¹⁰⁰ *See* City of Los Angeles Department of Water and Power Comments; City of Los Angeles Department of Water and Power Reply; Critical Infrastructure Coalition Comments; Jackson Electric Membership Corporation Reply; JVCKENWOOD USA Corporation Comments; FirstEnergy Corp. Comments; NextEra Energy, Inc. Comments; NextEra Energy, Inc. Reply.

¹⁰¹ *See* City of Los Angeles Department of Water and Power Comments at 3-4; Critical Infrastructure Coalition Comments at 3; Lower Colorado River Authority Comments at 9; Lower Colorado River Authority Reply at 2; Lower Colorado River Authority Aug. 19, 2019 *Ex Parte* at 2; NextEra Energy, Inc. Comments at 9-10 (citing Letter from Bryan N. Tramont & Timothy J. Cooney, Counsel to NextEra Energy, Inc., to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200, Attachments “Engineering Report” prepared by Gillespie, Prudhon & Associates, Inc., at 5 (NextEra GP&A Report) and “A Study of Issues” prepared by Dan Harris, Senior Scientist, Harris Corporation, at 3-10, 20 (filed Sept. 21, 2018) (NextEra Harris Report)); NextEra Energy, Inc. Reply at 1.

¹⁰² Duke Energy Comments at 11; Lower Colorado River Authority Comments at 4 (citing NextEra Harris Report at 5-22); NextEra Energy, Inc. Comments at 10 (citing NextEra Harris Report at 3-22); NextEra Energy, Inc. Reply at 5.

¹⁰³ *See* Critical Infrastructure Coalition Comments at 6; JVCKENWOOD USA Corporation Comments at 10; Lower Colorado River Authority Comments at 16; NextEra Energy, Inc. Comments at 12-13.

capacity and speed compared to existing nationwide and regional 4G networks.”¹⁰⁴ We anticipated in the *NPRM* that band realignment consisting of a 3/3 megahertz broadband segment could potentially fill the specific, tailored needs of utilities and other industrial entities, rather than act as a replacement for, or a direct competitor to, commercial wireless networks.¹⁰⁵ For example, Southern Company suggests the 3/3 megahertz broadband segment would provide dedicated capacity needed by private 900 MHz users.¹⁰⁶ The 3/3 megahertz broadband segment also supports 3GPP standard LTE service, which offers increased spectral efficiency to utilities and other part 90 users.¹⁰⁷

31. We are not persuaded by suggestions that the 900 MHz band transition is unnecessary because entities like FirstNet now are offering utilities service with more than 3/3 megahertz bandwidth.¹⁰⁸ Southern Company points out that FirstNet is required to provide priority access to public safety users and may not be able to provide the dedicated capacity needed for data-intensive, low latency applications and uses.¹⁰⁹ While FirstNet may meet some users’ communications needs in certain instances, we nonetheless find that realignment to create a broadband segment is in the public interest, as it provides another key option for a wide variety of part 90 users.

32. The *NPRM* sought comment on a possible broadband segment consisting of less than 3/3 megahertz, such as a paired 1.4 megahertz (1.4/1.4 megahertz) segment.¹¹⁰ Although some commenters support the creation of a 1.4/1.4 megahertz segment in at least some counties,¹¹¹ we conclude that limiting a broadband segment to a bandwidth smaller than 3/3 megahertz would not meet our important public interest goals because a 1.4/1.4 megahertz channel may be insufficient to support many utility needs.¹¹² For example, Southern Company deployed 800 MHz LTE using a 1.4/1.4 megahertz channel configuration and found it deficient in several respects,¹¹³ with lower throughput speeds and an inability

¹⁰⁴ JVCKENWOOD USA Corporation Comments at 10.

¹⁰⁵ 900 MHz *NPRM*, 34 FCC Rcd at 1554-55, para. 12; *see* Association of American Railroads Reply at 4; Enterprise Wireless Alliance Comments at 2; Southern Company Services, Inc. Reply at 4; UPS Comments at 11.

¹⁰⁶ Southern Company Services, Inc. Reply at 3-4, 9-10.

¹⁰⁷ *See* Overview of 3GPP Release 8 V0.3.3 (2014-09), at 37-38, http://www.3gpp.org/ftp/Information/WORK_PLAN/Description_Releases/; 3GPP Release 16: TS 38.101-1 V16.0.0 (2019-06) at 19, https://www.3gpp.org/ftp/Specs/2019-06/Rel-16/38_series/38101-1-g00.zip; Ericsson Comments at 5, Anterix Comments at 9, 10; *see also* 900 MHz *NPRM*, 34 FCC Rcd at 1554, para. 11.

¹⁰⁸ *See* Critical Infrastructure Coalition Comments at 6; Lower Colorado River Authority Comments at 16; NextEra Energy, Inc. Comments at 13.

¹⁰⁹ Southern Company Services, Inc. Reply at 1-3.

¹¹⁰ 900 MHz *NPRM*, 34 FCC Rcd at 1557, para. 20.

¹¹¹ *See, e.g.*, Southern California Edison Comments at 6 (“In order to expedite the rollout of broadband . . . the FCC should allow an interim 1.4 x 1.4 MHz channel deployment within the proposed 3 x 3 MHz broadband segment which the licensee could clear earlier to start operations.”); Utilities Technology Council Reply at 5 (urging the Commission to provide flexibility to allow broadband licensees to adopt a 1.4/1.4 MHz configuration within the 3/3 MHz broadband segment). Commenters that caution against the creation of the broadband segment also prefer a 1.4/1.4 megahertz broadband segment over a 3/3 megahertz one. *See, e.g.*, City of Los Angeles Department of Water and Power Comments at 4 (“The public interest is best served by a smaller 1.4/1.4 MHz broadband allocation made available through a voluntary, gradual transition.”); NextEra Energy, Inc. Comments at 18 (“Consistent with a purely voluntary approach, the Commission should permit – but not require – individual markets to choose to adopt a 1.4/1.4 MHz broadband configuration if the licensees choose to do so and all narrowband incumbents are protected or choose to relocate.”).

¹¹² Southern Company Services, Inc. Reply at 9.

¹¹³ *Id.* at 9-10; *see also* Letter from Michael D. Rosenthal, Director of Legal & External Affairs, Southern Linc, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200, at 2 (filed Sept. 9, 2019) (Southern *Ex Parte*).

to support many of the applications, technologies, and use cases identified for utility broadband communications and certain mission critical applications.¹¹⁴ Further, Southern found the 1.4/1.4 megahertz channel to be inefficient in allocating channel resources between signaling/control and data capacity, and it noted the decreased vendor support for features on a 1.4/1.4 megahertz channel.¹¹⁵ Although broadband licensees will have the flexibility to provide services using smaller bandwidths than 3/3 megahertz, we seek to ensure that sufficient spectrum, as reflected in a 3/3 megahertz deployment, is available for robust, efficient broadband applications, including for utilities and other industries requiring next-generation communications capabilities.

33. Although the *NPRM* sought comment on establishing a paired 5/5 megahertz broadband segment and some commenters support such an approach,¹¹⁶ we do not find that adopting a paired 5/5 megahertz broadband segment is in the public interest at this time. We agree with United Parcel Service that “consideration of any broadband operations beyond the Commission’s 3/3 megahertz proposal is currently premature.”¹¹⁷ We find the public interest is best served by providing 900 MHz licensees the option of continuing long-standing narrowband operations, which would be hindered with a realignment consisting of a 5/5 megahertz broadband segment. The Commission will monitor the progress of 3/3 megahertz broadband deployments and any continuing narrowband requirements before addressing whether future authorization of a 5/5 megahertz broadband segment is in the public interest. Adopting our 3/3 megahertz proposal at this time will also allow us to observe the interference environment in adjacent bands once broadband is deployed.

34. After reviewing the extensive record before us, we find that realignment of the 900 MHz band to create a broadband segment is in the public interest, and that it will further important goals of the Communications Act of 1934, including improving the efficiency of spectrum use.¹¹⁸ We also find that a 3/3 megahertz broadband segment is the best and most efficient alignment of 900 MHz spectrum because it not only fosters development of viable broadband services, but allows us to reserve at least four megahertz of 900 MHz spectrum for narrowband operations. We recognize that many entities have continuing narrowband communications needs, some of which are mission-critical communications. For example, the American Petroleum Institute detailed that its members cannot use commercial LTE products or networks because it claims a 3/3 megahertz channel cannot support its members’ speed and bandwidth needs and because commercial wireless broadband technology is at least ten years away from supporting the speed, bandwidth, performance, safety, reliability, and functionality characteristics needed to support oil and gas refineries and petrochemical facilities.¹¹⁹ The American Petroleum Institute also

¹¹⁴ Southern Company Services, Inc. Reply at 9-10; *see also* Southern *Ex Parte*.

¹¹⁵ Southern Company Services, Inc. Reply at 9-10; *see also* Southern *Ex Parte*.

¹¹⁶ *See* Anterix Comments at 10; Ericsson Comments at 4; Southern California Edison Comments at 4; Southern Company Comments at 4; Letter from Michael D. Rosenthal, Director of Legal and External Affairs, Southern Linc, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200 (filed March 4, 2020) (Southern Linc March 4, 2020 *Ex Parte*).

¹¹⁷ UPS Comments at 4; *see also* American Petroleum Institute and the Energy Telecommunications and Electrical Association Comments at 4; Burns & McDonnell Comments at 2; City of Los Angeles Department of Water and Power Comments at 8; Enterprise Wireless Alliance Comments at 4; Lower Colorado River Authority Comments at 24; National Association of Manufacturers Comments at 3; NextEra Energy, Inc. Comments at 18; Oncor Electric Delivery Company LLC Comments at 13; Sensus Comments at 4.

¹¹⁸ *See* 47 U.S.C. § 332(a)(2).

¹¹⁹ Letter from Suzanne Lemieux, Manager, Operations Security & Emergency Response, American Petroleum Institute, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200, at 2 n.3 (filed Mar. 11, 2020) (also urging the Commission to create a 900 MHz narrowband reserve for future system expansion). *But see* Letter from Elizabeth R. Sachs, Counsel to Anterix, Inc., to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200 (filed Mar. 16, 2020) (opposing American Petroleum Institute’s demand and explaining that the band has been “fully

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claims that narrowband communications are necessary for its members to safely operate oil and natural gas refineries because narrowband systems can support hands-free mobile voice communications in blast-proof areas and can withstand operations during extreme weather events such as hurricanes.¹²⁰ With today's approach to 900 MHz band realignment, 158 paired 12.5 kilohertz channels will remain available for continued narrowband operations.

35. *Location of the Broadband and Narrowband Segments.* We designate the 897.5-900.5/936.5-939.5 MHz band as the new 900 MHz broadband segment and reserve two narrowband segments—896-897.5/935-936.5 MHz and 900.5-901/939.5-940 MHz—on either side of the broadband segment. This will result in one paired three megahertz broadband segment that is compliant with 3GPP standards and two narrowband segments consisting of a paired 1.5 megahertz block and a paired .5 megahertz block, respectively. The *NPRM* proposed placing the 3/3 megahertz broadband segment at 897.5125/936.5125 MHz (channel 121) to 900.5/939.5 MHz (channel 360).¹²¹ However, to comply with 3GPP standards requiring all LTE carriers to conform to a carrier center in integer multiples of 100 kHz,¹²² we adjust the placement of the broadband segment to begin at the center frequency for existing channel 120 (897.5/936.5 MHz) and end at the center frequency for existing channel 360 (900.5/939.5 MHz).¹²³ The placement of the broadband segment so that it conforms to 3GPP specifications will encourage full use of the band and increase equipment availability.

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licensed for decades in the heavily populated areas where API seeks expansion capacity” and that the 900 MHz realignment is the only opportunity for making additional narrowband channels available).

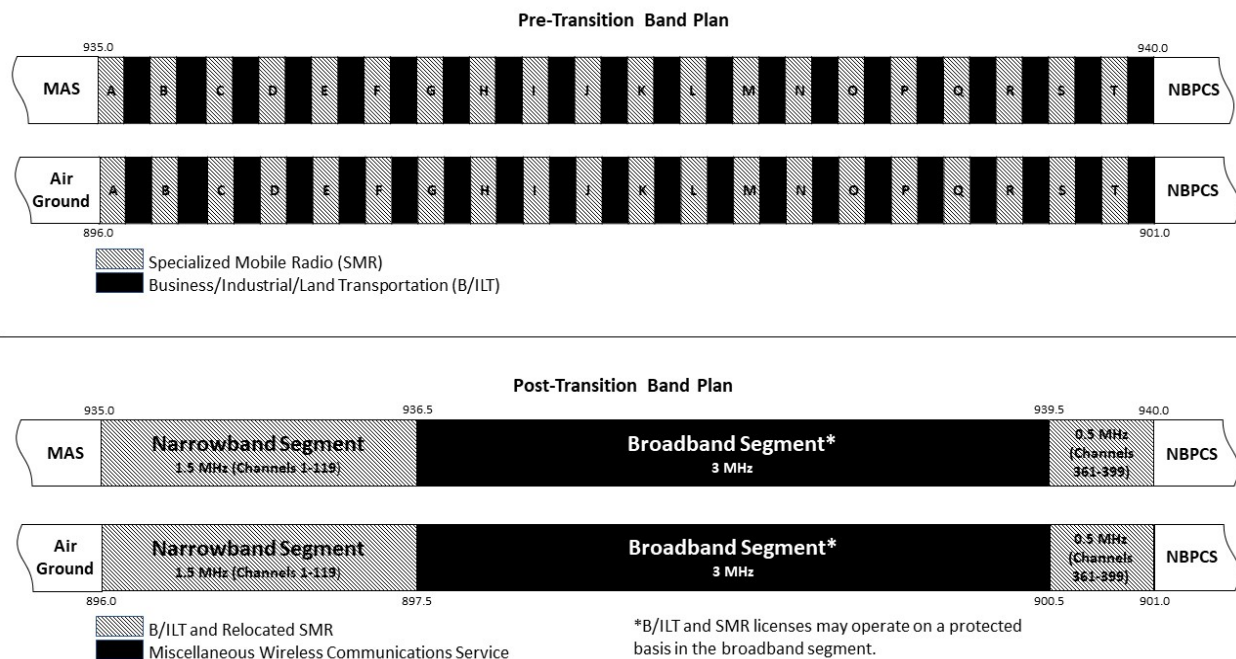
¹²⁰ Letter from C. Douglas Jarrett, Counsel to American Petroleum Institute, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200, at 1-2 (filed Jan. 17, 2020)

¹²¹ See 900 MHz *NPRM*, 34 FCC Rcd at 1555-56, para. 15 n.38.

¹²² Technical Specification ETSI TS 136 104 V15.7.0 (2019-07); see Letter from Elizabeth R. Sachs, Counsel to Anterix, Inc., to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200, at 2, Attach. A (filed Nov. 6, 2019) (Anterix Nov. 6, 2019 *Ex Parte*); see also Anterix Comments at 9, 10.

¹²³ See 47 CFR § 90.613. The narrowband segments will be composed of the existing channels with center frequencies from 896.0125/935.0125 MHz (channel 1) to 897.4875/936.4875 MHz (channel 119), and 900.5125/939.5125 MHz (channel 361) to 900.9875/939.9875 MHz (channel 399). See *id.* § 90.613.

900 MHz Band Plan



36. The placement of the band segments maintains the operational status quo of licensees within the 900 MHz band and provides substantial spectral separation to reduce the potential for interference to adjacent band services. The band plan we adopt today provides 1.5 megahertz of separation between the broadband segment and the 894-896 MHz Air-Ground Radiotelephone Service and the 932-935 MHz fixed microwave systems,¹²⁴ and it also provides 500 kilohertz of separation between the broadband segment and the 901-902/940-941 MHz Narrowband Personal Communications Service.¹²⁵ In addition, to avoid complicating band realignment, this band plan does not split any of the geographic SMR license blocks between the broadband segment and narrowband segments.¹²⁶ By adopting two separate narrowband segments, rather than a single 2/2 megahertz segment, we allow greater flexibility in frequency selection for narrowband licensees to provide adequate space between co-located channels.¹²⁷ We also note that placing the 1.5/1.5 megahertz narrowband segment on the lower side of the 900 MHz band reduces the impact of realignment on 900 MHz band channels assigned

¹²⁴ 900 MHz NPRM, 34 FCC Rcd at 1555-56, para. 15.

¹²⁵ *Id.* at 1555-56, para. 15.

¹²⁶ The broadband arrangement places SMR Blocks G through R entirely in the broadband segment; *see also* Anterix Comments at 9.

¹²⁷ Combiners used in a trunked system to aggregate the output of multiple transmitters into a single antenna can introduce excessive loss if used with channels that are too closely spaced. 800 MHz Public Safety Report and Order, 19 FCC Rcd at 15053-54, para. 156 (citing *Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Agency Communication Requirements Through the Year 2010; Establishment of Rules and Requirements for Priority Access Service*, Third Memorandum Opinion and Order and Third Report and Order, 15 FCC Rcd 19844, 19857, para. 30 (2000)). The use of two narrowband segments increases the options for greater spectral separation of co-located channels; *see also* Anterix Comments at 8.

throughout the country to the Association of American Railroads (AAR) for advanced train control systems.¹²⁸

37. The band plan we adopt today for 900 MHz broadband licensing is heavily supported by the record.¹²⁹ Commenters, including Air-Ground Radiotelephone Service and Narrowband Personal Communications Service licensees, stress that this configuration will help protect adjacent services from harmful interference. For example, Gogo Inc., the adjacent Air-Ground Radiotelephone Service licensee, concludes that “[a]dopting a 3/3 megahertz broadband segment, with narrowband operations remaining in the 896-897.5 MHz band, will help ensure that out-of-band emissions (OOBE) from mobile broadband devices do not cause harmful interference to adjacent [Air-Ground Radiotelephone Service] operations.”¹³⁰ Adjacent Narrowband Personal Communications Service licensees agree that this band plan protects their operations from harmful interference.¹³¹ We agree with commenters that this band plan creates separation between co-located frequencies.¹³² Space Data agrees that adopting a guard band and emission limits would help ensure adjacent Narrowband Personal Communications Service licensees do not experience harmful interference.¹³³ We find that the configuration we adopt will protect adjacent services from harmful interference. We find that paired 1.5 and .5 megahertz blocks are sufficient to accommodate current and future 900 MHz narrowband operations in transitioned markets.¹³⁴ EWA and Anterix support the proposed 1.5/1.5 and .5/.5 megahertz narrowband segments.¹³⁵ Narrowband

¹²⁸ See FCC Call Sign WPSF894; *Petition of Association of American Railroads (AAR) for Modification of Licenses for Use in Advanced Train Control Systems and Positive Train Control Systems*, Order, 16 FCC Rcd 3078, 3082, para. 10 (WTB PSPWD 2001) (granting a nationwide ribbon license surrounding railroad rights-of-way for frequency pairs 896.8875/935.8875 MHz, 896.9375/935.9375 MHz, 896.9875/935.9875 MHz, 897.8875/936.8875 MHz, 897.9375/936.9375 MHz, and 897.9875/936.9875 MHz). Specifically, locating the 1.5/1.5 megahertz (rather than the .5/.5 megahertz) narrowband segment at the bottom of the 900 MHz band reduces the number of railroad channels within the broadband segment from six to three.

¹²⁹ See, e.g., Anterix Comments at 8; Ericsson Comments at 4; Letter from Michele C. Farquhar and Tom Peters, Counsel to Gogo Inc., to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200, at 3 (filed Sept. 11, 2019) (*Gogo Ex Parte*); National Rural Electric Cooperative Association Reply at 2; Sensus Comments at 4; Space Data Comments at 2; Southern *Ex Parte*; Utilities Technology Council Comments at ii, 6-7; Utilities Technology Council Reply at 7.

¹³⁰ *Gogo Ex Parte* at 3.

¹³¹ Sensus Comments at 4; Southern *Ex Parte* at 2; Space Data Comments at 2.

¹³² See, e.g., Anterix Comments at 8; *Gogo Ex Parte* at 3; Utilities Technology Council Comments at 7-8.

¹³³ See Space Data Reply at 2.

¹³⁴ See Ameren Comments at 1-2, 4; American Petroleum Institute and the Energy Telecommunications and Electrical Association Comments at 2; Anterix Comments at 2, 4-7; Anterix Reply at 1-4; Azetti Networks Comments at 1; Council Rock Comments at 1; Critical Response Systems Comments at 1; Duke Energy Comments at 1-4; Encore Networks, Inc. Comments at 1; Enterprise Wireless Alliance Comments at 1, 4; Ericsson Comments at 2-3; Evergy *Ex Parte*; Flint Hills *Ex Parte*; General Electric Renewables Reply at 1; Hawaiian Electric Companies Comments at 3; Oldak *Ex Parte*; Mission Critical Partners, Inc. Comments at 1-2; Motorola Solutions, Inc. Comments at 1, 3; Multi-Tech Systems, Inc. Comments at 1; National Rural Electric Cooperative Association Reply at 1; New York Power Authority Reply at 2; Sensus Comments at 3; Sonim Comments at 1; Southern California Edison Comments at 3, 5-6; Southern California Edison Reply at 1-2; Southern Company Services, Inc. Comments at 4-5; Southern Company Services, Inc. Reply at 2; Tait Communications Comments at 1; UPS Comments at 2; UPS Reply at 2; Utilities Technology Council Comments at 1-2; Utilities Technology Council Reply at 2; Virtual Network Communications, Inc. Comments at 1; Wireless Infrastructure Association Reply at 1.

¹³⁵ See Anterix Comments at 8 (supporting the Commission’s proposal to create two narrowband segments, which it believes is “responsive to the concerns of some B/ILT licensees as it provides the opportunity to create separation between co-located frequencies in the frequency exchange process”); EWA Comments at 4 (urging the Commission

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operations will be relocated only if there is sufficient spectrum available to accommodate relocated incumbents.¹³⁶ Moreover, not all narrowband operations in a transitioned area will need to relocate from the new broadband segment, as broadband licensees will have the option of operating while providing interference protection to incumbents that remain in the broadband segment. We conclude that 1.5/1.5 and .5/.5 megahertz narrowband segments will provide sufficient spectrum to accommodate incumbents' relocations within the band and continuing narrowband operations.

2. Transition Process

38. We establish a negotiation-based transition that is comprised of several key elements: (a) negotiations between a prospective broadband licensee and incumbents in the broadband segment, in markets to be transitioned, for the acquisition, relocation to a narrowband segment, or protection of 900 MHz incumbents; (b) the option for the 900 MHz broadband licensee, under certain narrow circumstances, to relocate mandatorily remaining incumbents, except complex systems; and (c) an obligation for the 900 MHz broadband applicant to make any necessary anti-windfall payment to the U.S. Treasury. This combination leverages the speed and efficiency of a negotiation-based transition through private agreements while ensuring that, where negotiations are successful, we effectively expand access to broadband wireless communications services in the 900 MHz band.

a. Negotiation-based Transition

39. In the *NPRM*, we explained that “[a] transition of the 900 MHz band presents particular challenges given the unique spectrum characteristics, varied incumbent uses, and intensity of use in particular geographic areas. . . . As a result, any transition mechanism the Commission adopts for the 900 MHz band must account for such variations in the intensity of spectrum use across geographic areas and provide for alternatives where necessary.”¹³⁷ Today, we adopt a transition whereby 900 MHz band realignment can occur in a county through mutual agreement between the prospective broadband licensees and 900 MHz covered incumbents.¹³⁸ Through this approach, a prospective broadband licensee and 900 MHz covered incumbents may negotiate agreements for acquisition, relocation, or protection of narrowband operations currently in the 3/3 megahertz broadband segment on a county-by-county basis.

40. The record overwhelmingly supports a negotiation-based transition, which balances our public interest goals of expanding access to broadband wireless communications services, while maintaining access to sufficient spectrum for narrowband services.¹³⁹ For the following reasons, we find

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to retain its proposed band configuration of a 1.5/1.5 and .5/.5 megahertz segment for continued narrowband operations and a 3/3 megahertz broadband segment for broadband service).

¹³⁶ We reiterate that if there is insufficient spectrum in the narrowband segments to accommodate the relocation of an incumbent licensee, then it is likely no agreement will be reached and the county will not transition to broadband, unless the prospective broadband licensee opts to operate while providing interference protection to incumbents remaining in the broadband segment.

¹³⁷ 900 MHz *NPRM*, 34 FCC Rcd at 1559, para. 24.

¹³⁸ Under the transition approach we adopt today, a “covered incumbent” is defined as any 900 MHz site-based licensee in the broadband segment that is required under section 90.621(b) to be protected by a broadband licensee with a base station at any location within the county, or any 900 MHz geographic-based SMR licensee in the broadband segment that has a site in the county or within 70 miles of the county boundary.

¹³⁹ See Ameren Comments at 1, 2, 4; American Petroleum Institute and the Energy Telecommunications and Electrical Association Comments at 2; Anterix Comments at 2, 4-7; Anterix Reply at 1-4; Azetti Networks Comments at 1; Council Rock Comments at 1; Critical Response Systems Comments at 1; Duke Energy Comments at 1-4; Encore Networks, Inc. Comments at 1; Enterprise Wireless Alliance Comments at 1, 4; Ericsson Comments at 2-3; Evergy *Ex Parte*; Flint Hills *Ex Parte*; General Electric Renewables Reply at 1; Hawaiian Electric Companies Comments at 3; Oldak *Ex Parte*; Mission Critical Partners, Inc. Comments at 1-2; Motorola Solutions,

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that a negotiation-based transition is the most effective and efficient path at this time to deploy 900 MHz broadband successfully.¹⁴⁰

41. *First*, a negotiation-based transition provides interested parties with the flexibility to effect a successful, timely, and efficient transition, based on the realities of operations in the relevant county. Parties mutually interested in 900 MHz broadband service have the flexibility to expeditiously reach agreements in any U.S. market, whether urban or rural. The negotiation-based transition permits realignment of the 900 MHz band and departs from the legacy band plan that blocked broadband deployment even where licensees sought access. We anticipate that rural counties, with traditionally fewer incumbents, may be the first to transition to broadband. As the National Rural Electric Cooperative Association explains, “[b]ecause the heaviest use of the 900 MHz band is in urban and suburban counties . . . many rural areas will be available for deployment of the 900 MHz broadband allocation with little or no incumbent relocations required. A 900 MHz broadband licensee will likely be able to deploy to such rural markets shortly after the Commission adopts a 900 MHz broadband segment.”¹⁴¹

42. *Second*, the approach we adopt today has the greatest chance of success for band realignment in the near term because it empowers 900 MHz band incumbents. Only incumbents may apply, in their discretion, for a 900 MHz broadband license. Alternatively, in the vast majority of cases, an incumbent not seeking its own broadband license has the flexibility to determine whether to negotiate with a prospective 900 MHz broadband licensee regarding the terms of any relocation or protection. For example, Anterix has negotiated various tailored agreements with different incumbents, where “[i]n some cases, it has agreed to exchange frequencies with an incumbent while in others, the incumbent has elected to move out of the 900 MHz band entirely.”¹⁴² By adopting a negotiation-based transition where parties reach mutually agreeable terms for spectrum relocation, we ensure that any relocated incumbents will be fairly compensated and that the appropriate party pays these costs. As commenters explain, a negotiation-based transition provides each 900 MHz band incumbent the “opportunity to determine its best path forward”¹⁴³ and “ensures that the relocated party is satisfied with the terms and timing of its relocation.”¹⁴⁴ We agree with the National Association of Manufacturers and MRFAC, Inc. that

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Inc. Comments at 1, 3; Multi-Tech Systems, Inc. Comments at 1; National Rural Electric Cooperative Association Reply at 1; New York Power Authority Reply at 2; Sensus Comments at 3; Sonim Comments at 1; Southern California Edison Comments at 3, 5-6; Southern California Edison Reply at 1-2; Southern Company Services, Inc. Comments at 4-5; Southern Company Services, Inc. Reply at 2; Tait Communications Comments at 1; UPS Comments at 2; UPS Reply at 2; Utilities Technology Council Comments at 1-2; Utilities Technology Council Reply at 2; Virtual Network Communications, Inc. Comments at 1; Wireless Infrastructure Association Reply at 1.

¹⁴⁰ See Anterix Comments at 18; Anterix Reply at 5, 15; Enterprise Wireless Alliance Comments at 7-8; Enterprise Wireless Alliance Reply at 3; Ericsson Comments at 4; Hawaiian Electric Companies Comments at 7-8; Southern California Edison Comments at 17-18, 20-21; Southern California Edison Reply at 7-8, 10; UPS Comments at 14.

¹⁴¹ National Rural Electric Cooperative Association Reply at 3; *see also* Utilities Technology Council Reply at 15 (“Voluntary relocation has the twin advantages of 1) promoting faster realignment of the band through privately negotiated agreements, between incumbents, and 2) minimizing disruption of incumbent systems in the band.”).

¹⁴² Anterix Comments at 13. Anterix elaborates that “[i]n particular, incumbents that are in the process of replacing or upgrading their narrowband systems often are interested in deploying them on frequencies outside the proposed broadband segment to avoid future changes to their facilities.” *Id.*

¹⁴³ Anterix Reply at 7.

¹⁴⁴ Southern California Edison Reply at 5.

incumbents “are in the unique position to determine whether [a broadband proponent’s] offer meets their needs or not.”¹⁴⁵

43. *Third*, realignment only will occur in the counties where the prospective broadband licensee successfully negotiates the acquisition, relocation, or protection of a substantial number of incumbents in a county. Some commenters express concern that a 900 MHz band realignment could disrupt incumbent operations and/or that there will not be enough spectrum in the new narrowband segment to properly accommodate incumbent operations.¹⁴⁶ The negotiation-based transition we adopt today safeguards against that risk insofar as incumbents in most circumstances would be agreeing to the acquisition, relocation, or protection of their licenses. For example, a broadband licensee could only move forward by reaching a voluntary agreement with most incumbents in a market and, in those cases involving mandatory relocation, the incumbent would be entitled to compensation for reasonable relocation costs and provision of comparable facilities. Moreover, certain larger incumbents will be exempt from mandatory relocation.

44. We find that a negotiation-based transition we adopt today fulfills the Commission’s statutory obligation to license spectrum in the public interest.¹⁴⁷ In adopting this approach, we rely on the Commission’s authority under section 309, which governs the Commission’s process for granting licenses under Title III.¹⁴⁸ Section 309(j)(6)(E) makes clear that the Commission has an “obligation in the public interest to . . . use engineering solutions, negotiation, threshold qualifications, service regulations, and other means in order to avoid mutual exclusivity in application and licensing proceedings.”¹⁴⁹ If the Commission determines that the public interest would be better served by employing a competitive bidding process—rather than any of the methods specified in section 309(j)(6)(E)—for granting initial licenses, then it may use its auction authority under section 309(j)(1) to grant such a license.¹⁵⁰

45. Section 309 gives the Commission discretion to adopt spectrum management approaches tailored to specific bands. Our approach here takes advantage of the unique circumstances of the 900 MHz band, which consists of only ten total megahertz, with many existing incumbents that have been in operation for decades. These incumbents have extensive knowledge of the band’s characteristics and usage and are best positioned to negotiate appropriate terms for transitioning the band for a more robust use. This is particularly true in heavily encumbered areas, where the mechanics of clearing the band may be more complicated, but can be facilitated by those with the proper expertise and incentives to effectuate the transition effectively and successfully. In addition, as band usage may differ county-by-county, this approach ensures that the band is transitioned only where negotiations have proven successful for most incumbent sites.

46. We sought comment on using our authority to issue initial 900 MHz broadband licenses

¹⁴⁵ National Association of Manufacturers and MRFAC, Inc. Comments at 4. MRFAC, Inc., formerly known as the Manufacturers Radio Frequency Advisory Committee, is an authorized Federal Communications Commission frequency coordinator. See MRFAC, <http://www.mrfac.com/> (last visited Mar. 25, 2020).

¹⁴⁶ See American Petroleum Institute and the Energy Telecommunications and Electrical Association Comments at 3; City of Los Angeles Department of Water and Power Comments at 3-4; Critical Infrastructure Coalition Comments at 3, 4; Duke Energy Comments at 3, 11; Lower Colorado River Authority Comments at 3-9; Lower Colorado River Authority Reply at 2-3, 10-16; Lower Colorado River Authority Aug. 19, 2019 *Ex Parte* at 1; National Association of Manufacturers and MRFAC, Inc. Comments at 3; NextEra Energy, Inc. Comments at 9-10; NextEra Energy, Inc. Reply at 1; Oncor Electric Delivery Company LLC Comments at 4-5.

¹⁴⁷ See 47 U.S.C. § 309.

¹⁴⁸ See *id.*

¹⁴⁹ *Id.* § 309(j)(6)(E).

¹⁵⁰ See *id.* § 309(j)(6)(E); see also H.R. Conf. Rep. 103-213 at 485.

based on successful private negotiation, and commenters agree that adopting this negotiation-based transition is within our authority.¹⁵¹ Anterix explains that the Commission “has broad discretion in determining how to make spectrum available to serve the public interest,”¹⁵² and the Ad Hoc Refiners Group and National Electric Cooperative Association maintain that the Commission’s negotiation-based approach is in the public interest.¹⁵³

47. We also recognize that this approach is potentially a first step to a transition to broadband and we seek to maximize the number of markets that can do so quickly. In the *NPRM*, the Commission sought comment on “alternatives to be used in combination with a voluntary exchange process.”¹⁵⁴ The Commission sought comment on whether an auction of overlay 900 MHz broadband licenses, coupled with the overlay licensee’s right to require the relocation of narrowband incumbents from the broadband segment, might be a viable alternative method in certain markets to ensure adequate access to broadband spectrum.¹⁵⁵ We also sought comment on whether the Commission should consider using its incentive auction authority to reduce encumbrances in the 900 MHz band.¹⁵⁶ Most commenters that address the issue oppose either type of auction,¹⁵⁷ and some commenters contend that an auction as described in the *NPRM* may never be appropriate.¹⁵⁸ Oncor, for example, opposes auctions due to their “administrative and legal complexities.”¹⁵⁹ Southern California Edison cautions that an incentive auction would “too heavily favor existing SMR incumbents to the detriment of other bidders”¹⁶⁰ and the Hawaiian Electric Companies agrees that such an auction would “guarantee a windfall for current SMR licensees.”¹⁶¹ While some commenters support an overlay auction,¹⁶² others note that, on balance, the costs of either type of

¹⁵¹ 900 MHz *NPRM*, 34 FCC Rcd at 1560, para. 26; *see* Ad Hoc Refiners Group Reply at 11; Anterix Comments at 11; National Rural Electric Cooperative Association Reply at 3.

¹⁵² *See* Anterix Comments at v.

¹⁵³ *See* Ad Hoc Refiners Group Reply at 11; National Rural Electric Cooperative Association Reply at 3.

¹⁵⁴ 900 MHz *NPRM*, 34 FCC Rcd at 1559, para. 25.

¹⁵⁵ *Id.* at 1565, para. 41.

¹⁵⁶ *Id.* at 1566-67, para. 48 (citing 47 U.S.C. § 309(j)(8)(G)).

¹⁵⁷ *See* City of Los Angeles Department of Water and Power Reply at 11; Lower Colorado River Authority Comments at 16; Motorola Solutions, Inc. Comments at 4; National Association of Manufacturers and MRFAC, Inc. Comments at 5; NextEra Energy, Inc. Comments at 16; Oncor Electric Delivery Company LLC Comments at 6-7; *see also* Ad Hoc Refiners Group Reply at 11; Alliant Energy Corporate Services, Inc. Reply at 2; Caesars Entertainment Corporation Reply at 3; Critical Infrastructure Coalition Comments at 6, 8; JVCKENWOOD USA Corporation Comments (all opposing any mandatory relocation but not specifically discussing an auction mechanism); Letter from Brian D. Weimer, Counsel to San Diego Gas & Electric, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200, Attach. B at 7 (filed Feb. 13, 2020) (San Diego Gas & Electric Feb. 13, 2020 *Ex Parte*). *cf.* Anterix Comments at 18; Anterix Reply at 5, 15; Enterprise Wireless Alliance Comments at 7-8; Enterprise Wireless Alliance Reply at 3; Ericsson Comments at 4; Hawaiian Electric Companies Comments at 7-8; Southern California Edison Comments at 17-18, 20-21; Southern California Edison Reply at 7-8, 10; UPS Comments at 14 (all supporting some form of auction with a mandatory component following a negotiation-based transition).

¹⁵⁸ *See* City of Los Angeles Department of Water and Power Reply at 11; Lower Colorado River Authority Comments at 16; Motorola Solutions, Inc. Comments at 4; National Association of Manufacturers and MRFAC, Inc. Comments at 5; NextEra Energy, Inc. Comments at 16; Oncor Electric Delivery Company LLC Comments at 6-7.

¹⁵⁹ Oncor Comments at 7.

¹⁶⁰ Southern California Edison Comments at 16.

¹⁶¹ Hawaiian Electric Companies Comments at 8.

¹⁶² *See, e.g., id.* at 7; Southern California Edison Comments at 13-15.

auction outweigh its benefits.¹⁶³ For instance, the City of Los Angeles Department of Water and Power argues that the costs on licensees from auction models would not only limit utility access to licenses, but would also consume resources that could otherwise be allocated towards compensating incumbents for the costs imposed by the realignment.¹⁶⁴ We decline to implement a broadband transition mechanism at this time that would result in the filing of mutually exclusive applications that would require resolution through competitive bidding. Based on the record before us, we agree with commenters that a negotiation-based approach has the potential to produce “the most expedient and efficient realignment of the 900 MHz band.”¹⁶⁵

48. In 2021, we will evaluate the success of the 900 MHz band realignment and explore whether we should adopt an additional mechanism to transition the 900 MHz band to broadband. This evaluation will necessarily involve consideration of potential next steps, such as implementing an auction mechanism if the negotiation-based transition does not successfully result in 900 MHz band realignment; closing the window on filing 900 MHz broadband applications; and/or lifting the application freeze to permit new and expanded use of 900 MHz narrowband operations beyond incumbent relocations.¹⁶⁶ We find this timeframe serves the public interest because it provides sufficient time to evaluate the extent to which the 900 MHz band has successfully transitioned to broadband.¹⁶⁷

49. Finally, we decline to adopt additional constraints on privately negotiated agreements as certain commenters propose.¹⁶⁸ For example, we reject the Utilities Technology Council’s suggestion that we require certain terms in all agreements, such as “1) Replacement of lost narrowband frequency pairs 2) Outline methods of monetary compensations for rebanding efforts and to assist replacement of lost narrowband frequencies and 3) Provide a temporary means of operating on a narrowband basis while guaranteeing broadband licenses to utilities for future operations.”¹⁶⁹ We find that mandating these three terms in agreements could potentially disrupt private negotiations and significantly slow down the transition, particularly in markets that could be transitioned immediately. The approach we adopt today affords parties with firsthand knowledge of the specific situation the flexibility to negotiate mutually agreeable terms.

50. *Covered Incumbent Definition.* Here, we define the group of “covered incumbents” with which a prospective broadband licensee must negotiate when seeking a broadband license in a given county. In the *NPRM*, we proposed to define “covered incumbents” as any site-based licensee that under current rules is required to be protected by the placement of a broadband licensee’s base station at any location within the county.¹⁷⁰ We recognize, however, that an incumbent geographic-based licensee located in the broadband segment would also require protection from a new broadband entrant. We therefore define “covered incumbent” as any 900 MHz site-based licensee in the broadband segment that under section 90.621(b) is required to be protected by a broadband licensee that locates a base station

¹⁶³ See, e.g., City of Los Angeles Department of Water and Power Reply; Motorola Solutions, Inc. Comments at 4; Oncor Comments.

¹⁶⁴ City of Los Angeles Department of Water and Power Reply at 11.

¹⁶⁵ See, e.g., Anterix Comments; Oncor Comments at 7; Southern Company Services, Inc. Comments.

¹⁶⁶ 900 MHz *NPRM*, 34 FCC Rcd at 1564, para. 39.

¹⁶⁷ See 47 U.S.C. § 309(j)(1).

¹⁶⁸ See American Petroleum Institute and the Energy Telecommunications and Electrical Association Comments at 3; Utilities Technology Council Comments at 18.

¹⁶⁹ Utilities Technology Council Comments at 18.

¹⁷⁰ 900 MHz *NPRM*, 34 FCC Rcd at 1562, para. 32.

anywhere within the county, or any 900 MHz geographic-based SMR licensee in the broadband segment that has a site in the county or within 70 miles of the county boundary.

51. Although most commenters do not address in detail how we should define “covered incumbent,” AAR asserts that, because our proposed definition included only site-based licensees, and its nationwide ribbon license is not technically site-based, AAR would not be entitled to the proposed protections.¹⁷¹ Other stakeholders addressing the issue of how to define a covered incumbent simply support the definition as proposed.¹⁷² Commenters agree that all covered incumbents must be fully protected against harmful interference and that any transition must minimize disruption.¹⁷³ We find that the definition of covered incumbent adopted today sufficiently captures the class of licensees with which a prospective broadband licensee in a county must negotiate, given its location in, or sufficient proximity to, that county. By basing the definition on protection criteria, we also mitigate against potential harmful interference that might result from the prospective broadband licensee’s co-channel operations, and we provide the prospective broadband licensee with flexibility to determine how and where to deploy its network while meeting the interference protection criteria.

52. We note that a variety of secondary operations currently are licensed in the 900 MHz band, which do not receive primary protection under section 90.621(b). Consistent with prior Commission actions, we will not include these licensees within the definition of covered incumbents, and a prospective broadband licensee will have no obligation to acquire, relocate, or protect these secondary operations.¹⁷⁴ A prospective broadband licensee may elect for business and operational reasons to acquire, relocate, or protect such secondary licensees. For example, a prospective broadband licensee in negotiations with a covered incumbent holding both primary and secondary authorizations may seek to provide an incentive for covered incumbent primary license(s) relocation by also addressing that licensee’s secondary operations. We clarify that, absent an agreement with a prospective broadband licensee, a secondary license retains its secondary status and is not entitled to protection, whether it remains in the broadband segment or is relocated to the narrowband segment.

b. Broadband License Eligibility

53. For an applicant to be eligible for a broadband license in a county, it must: (1) hold the licenses for more than 50% of the total amount of licensed 900 MHz SMR (site-based or geographically licensed) and B/ILT (site-based) spectrum for the relevant county; and (2) hold spectrum in the broadband segment or reach an agreement to clear through acquisition or relocation, or demonstrate how it will provide interference protection to, covered incumbent licensees collectively holding licenses in the broadband segment for at least 90% of the site-channels in the county and within 70 miles of the county boundary. We find that these criteria best facilitate the 900 MHz band’s transition while also protecting incumbents.

¹⁷¹ Association of American Railroads Comments at 4.

¹⁷² See National Association of Manufacturers and MRFAC, Inc. Comments at 4; UPS Comments at 12; Utilities Technology Council Comments at 18; Utilities Technology Council Reply at 20.

¹⁷³ See, e.g., American Petroleum Institute and the Energy Telecommunications and Electrical Association Comments at 4; Critical Infrastructure Coalition Comments at 3; City of Los Angeles Department of Water and Power Comments at 6-7; Enterprise Wireless Alliance Comments at 5; NextEra Energy, Inc. Comments at 17; Anterix Comments at 13; National Association of Manufacturers and MRFAC, Inc. Comments at 4; UPS Comments at 12; Utilities Technology Council Comments at 18; Utilities Technology Council Reply at 19.

¹⁷⁴ See, e.g., *Improving Pub. Safety Commc'ns in the 800 MHz Band*, WT Docket 02-55, Supplemental Order and Order on Reconsideration, 19 FCC Rcd 25120, 25144, para. 56 (2004).

54. *50% Spectrum Threshold.* We require that, to be eligible for a broadband license, an applicant¹⁷⁵ must hold licenses for more than 50% of the total amount of licensed 900 MHz spectrum (whether SMR or B/ILT) in the relevant county. The 50% threshold also credits an applicant for spectrum included in an application to acquire or relocate a covered incumbent that is filed with the Commission on or after the *NPRM*'s release date, March 14, 2019. After review of the record, we find it in the public interest to adopt this expanded eligibility criterion. The *NPRM* proposed that the broadband license applicant must hold all 20 geographically licensed SMR blocks for the relevant county,¹⁷⁶ and we find that the *NPRM*'s approach might inadvertently bar applications from the very entities that could most benefit from a broadband service. This approach also eliminates the potential for the filing of mutually exclusive applications in a county and therefore permits private negotiations among 900 MHz band licensees to drive the issuance of new initial licenses.

55. While we proposed in the *NPRM* that the broadband license applicant must hold all 20 geographically licensed SMR blocks for the relevant county, we also sought comment on alternative eligibility criteria.¹⁷⁷ There is extensive support for the alternative approach we adopt today, as commenters encourage us to expand the eligibility criteria to permit applicants to qualify for 900 MHz broadband licenses using any 900 MHz spectrum holdings in the relevant county.¹⁷⁸ The City of Los Angeles Department of Water and Power argues that the eligibility requirements should "ensure opportunities to develop broadband networks and technologies in the band are more equally and fairly distributed."¹⁷⁹ Lower Colorado River Authority submits that all 900 MHz licensees, including site-based B/ILT licensees, should be eligible to obtain a broadband license.¹⁸⁰ Utilities Technology Council argues that permitting applicants to demonstrate eligibility using any combination of 900 MHz spectrum "provide[s] additional flexibility to enable utilities and other B/ILT licensees to be able to become broadband licensees either individually or in partnership with an SMR licensee."¹⁸¹ Anterix explains that this requirement is necessary to ensure that the broadband licensee possesses enough 900 MHz spectrum to "justif[y] the right to consolidate its channels and convert to broadband service."¹⁸² We agree and adopt the expanded eligibility criterion that will permit an applicant holding more than 50% of the total licensed 900 MHz spectrum (whether SMR or B/ILT) in the relevant county to be eligible for a broadband license. We find that the 50% spectrum threshold helps achieve our public interest goals of identifying the applicant best positioned to deploy broadband in the 3/3 megahertz segment expeditiously.

56. To determine whether an applicant has satisfied the requisite spectrum threshold for a given county, an applicant may include spectrum associated with: (1) 900 MHz geographic licenses covering all or part of that county, (2) 900 MHz site-based stations with service contours that intersect

¹⁷⁵ We clarify that the applicant must be associated with a single FCC Registration Number.

¹⁷⁶ *900 MHz NPRM*, 34 FCC Rcd at 1560-61, paras. 28-31.

¹⁷⁷ *Id.* at 1560-61, paras. 28-31.

¹⁷⁸ See, e.g. American Petroleum Institute and the Energy Telecommunications and Electrical Association Comments at 6; City of Los Angeles Department of Water and Power Reply at 6-9, 19; Lower Colorado River Authority Comments at 15, 19; Southern California Edison Comments at 3; Southern California Edison Reply at 3-4; Utilities Technology Council Comments at 17; Utilities Technology Council Reply at 16-18; see also Anterix Comments at 24-25; Southern California Edison Comments at 12-13; Utilities Technology Council Comments at 18; Utilities Technology Council Reply at 19.

¹⁷⁹ City of Los Angeles Department of Water and Power Reply at 9.

¹⁸⁰ Lower Colorado River Authority Comments at 19 (also noting that large site-based incumbents actually may be better positioned to effectuate the relocation to broadband operations).

¹⁸¹ Utilities Technology Council Reply at 17.

¹⁸² Anterix Comments at 19.

that county's boundary, and (3) credit for 900 MHz spectrum used to facilitate timely acquisitions or relocations. We will calculate a percentage based on the applicant's holdings versus the total amount of spectrum currently licensed in that county to determine whether the applicant holds more than 50% of the licensed 900 MHz spectrum in the county. In the *NPRM*, we sought comment on how to apply our proposed eligibility restriction in markets where the Commission holds some SMR inventory, because in those markets the prospective broadband licensee could not hold all 20 geographically licensed blocks of SMR spectrum.¹⁸³ Anterix seeks to exclude from the spectrum threshold SMR blocks held in Commission inventory, so that a broadband applicant would be deemed to hold 100% of blocks in a county where the applicant holds, for example, 19 of 20 total blocks, but only 19 have been licensed.¹⁸⁴ Anterix also suggests modifying the proposed rule to provide "credit" for spectrum provided by the applicant to facilitate incumbent relocations (e.g., leasing, partitioning, disaggregation) so as not to penalize applicants taking action to clear an incumbent from the broadband segment prior to release of this *Report and Order*.¹⁸⁵ We find it in the public interest to adopt a spectrum threshold based on the total amount of 900 MHz spectrum licensed in a county (i.e., excluding 900 MHz spectrum in Commission inventory), and to provide credit to an applicant for timely using its spectrum holdings to acquire or relocate a covered incumbent. An applicant may use any combination of 900 MHz band spectrum, and any applicant may become eligible for the broadband license by obtaining the required spectrum through secondary markets transactions,¹⁸⁶ provided it meets the other eligibility criteria we adopt.

57. A 900 MHz geographic-area licensee may include spectrum from licenses covering all or part of that county. An applicant that is a site-based B/ILT or site-based SMR licensee may meet the 50% spectrum threshold for a given county by demonstrating that its base station(s) service contour(s) intersects a county boundary.¹⁸⁷ Pursuant to section 90.621(b) of the Commission's rules, a field strength of 40 dBμV/m is used to calculate 900 MHz B/ILT and SMR fixed base station service contours.¹⁸⁸ The Commission has previously stated that it intended the 40 dBμV/m field strength to create an average 20-mile radius around a base station.¹⁸⁹ To minimize burdens on an applicant that is a site-based licensee seeking to demonstrate that fixed base station service contours intersect a county boundary, we provide flexibility and will permit it to use a standard 20-mile radius around the base station(s) to determine the

¹⁸³ 900 MHz *NPRM*, 34 FCC Rcd at 1561, para. 31.

¹⁸⁴ Anterix Comments at 21. See 900 MHz *NPRM*, 34 FCC Rcd at 1561, para. 31.

¹⁸⁵ Anterix Comments at 26, 30.

¹⁸⁶ These transactions include assignment, partitioning and disaggregation. We clarify that, for broadband license eligibility purposes, a licensee cannot count spectrum it leases from another towards its spectrum total.

¹⁸⁷ Appendix D provides illustrations of how site-based licensees can perform these calculations.

¹⁸⁸ 47 CFR § 90.621(b), Short-Spacing Separation Table, n.2; see also *Co-Channel Protection Criteria for Part 90, Subpart S Stations Operating Above 800 MHz*, PR Docket No. 93-60, Report and Order, 8 FCC Rcd 7293, 7293-95, paras. 2, 5, 11 (1993); *Amendment of Parts 2 and 22 of the Commission's Rules Relative to Cellular Communications Systems*; *Amendment of Parts 2, 15, and 90 of the Commission's Rules and Regulations to Allocate Frequencies in the 900 MHz Reserve Band for Private Land Mobile Use*; *Amendment of Parts 2, 22 and 25 of the Commission's Rules to Allocate Spectrum for, and to Establish Other Rules and Policies Pertaining to the Use of Radio Frequencies in a Land Mobile Satellite Service for the Provision of Various Common Carrier Services*, GEN Docket Nos. 84-1231, 84-1233, and 84-1234, Report and Order, 2 FCC Rcd 1825, 1831, para. 46 (1986) (adding the 900 MHz B/ILT service to the 800 MHz rules, including Section 90.621).

¹⁸⁹ See *Amendment of Part 90 of the Commission's Rules to Release Spectrum in the 806–821/851–866 MHz Bands and to Adopt Rules and Regulations Which Govern Their Use*; *Amendment of Part 90 of the Commission's Rules to Facilitate Authorization of Wide-Area Mobile Radio Communications Systems*; *An Inquiry Concerning the Multiple Licensing of 800 MHz Radio Systems ('Community Repeaters')*; *Amendment of Section 90.385(c) of the Commission's Rules to Allow Transmission of Non-Voice Signals at 800 MHz*, PR Docket Nos. 79-191, 79-334, 79-107, and 81-703, Second Report and Order, 90 F.C.C.2d 1281, 1283, 1321, paras. 7 n.12, 135 (1982).

service area without a requirement that it submit contour calculations using the 40 dB μ V/m field strength. In the alternative, if it chooses, an applicant that is a site-based licensee may submit to the Commission for evaluation its specific calculations of its service areas using the 40 dB μ V/m field strength based on sound, industry-accepted engineering practices that take terrain into consideration. To clarify, we will permit site-channels in and within 20 miles of a county boundary to contribute to the applicant's spectrum total for a certain county. For accuracy, however, we will permit channels to be counted only a single time for a particular county. For example, if Locations A and B are within 20 miles of a county and an applicant operates at Location A on Channels 1, 2, and 3 (each a paired 12.5 kilohertz channel), and Location B on Channels 1 and 4, then the applicant can include Channel 1 for only one location (not for both Locations A and B), for a total sum for both Locations A and B of 100 kilohertz.

58. *Acquisition, Relocation, or Protection of Covered Incumbents or Hold Spectrum.* We also find it in the public interest to require an applicant, as part of its eligibility for a broadband license, to hold spectrum in the broadband segment and/or reach an agreement to clear through acquisition or relocation, or demonstrate how it will provide interference protection to, covered incumbent licensees collectively holding licenses in the broadband segment for at least 90% of the site-channels in the county and within 70 miles of the county boundary, in which it seeks the broadband license.¹⁹⁰ By broadband segment, we clarify that this requirement includes the acquisition, relocation, or protection of any covered incumbent whose channels are fully or partially impacted, i.e., covered incumbents in channels 120 to 360. We also clarify that the applicant's own spectrum holdings are included in the 90% of site-channels in and within 70 miles of the county. For this eligibility prong, site-channels are counted if they are located in and within 70 miles of the county, the established criteria for determining covered incumbency.¹⁹¹ If any site of a complex system is located in or within 70 miles of a county, an applicant must either hold the license for that site or reach an agreement to acquire, relocate, or protect it in order to demonstrate eligibility.

59. A prospective broadband licensee may offer to a covered incumbent for the purposes of relocation no more spectrum than the incumbent currently holds, except where doing so is necessary to achieve equivalent coverage and/or capacity.¹⁹² Although we seek to provide maximum flexibility to the negotiating parties, we find the public interest is served by ensuring that the Commission remains spectrally whole to the greatest extent possible. For this reason, we minimize the amount of spectrum from the Commission's inventory that can be used to support relocation. This policy also maximizes the spectrum available for relocation of current incumbents and any future narrowband licensing.¹⁹³ We note that we do not prohibit the prospective broadband licensee and incumbents from agreeing to relocate to less spectrum than the incumbent currently holds.¹⁹⁴

60. We clarify that a site-channel is any channel licensed at a particular location. We also clarify that the prospective broadband licensee must acquire, relocate, or protect covered incumbents that

¹⁹⁰ 900 MHz NPRM, 34 FCC Rcd at 1562, para. 32.

¹⁹¹ This is in contrast to the 50% spectrum threshold prong which, for B/ILT or SMR site-based licensees, is triggered by having a 20-mile contour overlap a county boundary.

¹⁹² For example, if a B/ILT incumbent currently is operating on five channels of spectrum in the broadband segment, the prospective broadband licensee may offer the incumbent no more than five channels in the narrowband segment to effectuate relocation, unless additional channels are necessary to achieve equivalent coverage and/or capacity. Commenters support this proposed exception. See Critical Infrastructure Coalition Comments at 7; National Association of Manufacturers and MRFAC, Inc. Comments at 5; Oncor Electric Delivery Company LLC Comments at 10; see also UPS Comments at 12-13.

¹⁹³ 900 MHz NPRM, 34 FCC Rcd at 1563-64, para. 36.

¹⁹⁴ For example, parties are free to negotiate for other consideration—e.g., monetary payments, costs of relocation—in combination with, or in lieu of, relocation spectrum.

are geographically licensed SMR systems licensed on an MTA basis and not licensed at a specific location, as long as the SMR licensee has a site in the county or within 70 miles of the county boundary. Pursuant to the 900 MHz co-channel separation requirements contained in section 90.621(b), co-channel systems must comply with a minimum spacing criteria of at least 113 kilometers (70 miles) separation distance between base stations.¹⁹⁵ The Commission's rules permit closer base station mileage separations through: (1) compliance with a specific mileage separation chart, which allows separations down to a minimum of 88 kilometers (55 miles) based on various base station height above average terrain/effective radiated power combinations; or (2) by agreement to lesser separation distances through the filing of concurrence letters from each affected co-channel licensee.¹⁹⁶ We also find it necessary to require a prospective broadband licensee to protect geographically licensed SMRs, if not relocated, through a private contractual agreement, as section 90.621(b) requirements are currently applicable only to protection of site-based systems and not to geographic licensees. Because geographically licensed SMRs have the flexibility to locate sites anywhere within their MTA, such locations are not identified in the Commission's Universal Licensing System (ULS). A prospective broadband licensee that opts to provide interference protection to geographically licensed SMR sites, rather than to relocate such licensees to different frequencies, must determine the location of the incumbent sites through discussions with the covered SMR incumbent, and it must explain in its application how it will protect incumbent sites in operation as of the date its application is filed with the Commission.¹⁹⁷

61. While we expect that many counties will be transitioned primarily through relocation agreements between prospective broadband licensees and covered incumbents, a prospective broadband licensee is not required to relocate all covered incumbents from the broadband segment. Rather, the prospective broadband licensee can opt to locate its base station(s) a sufficient distance from a narrowband incumbent licensee to afford the requisite protection against harmful interference. Anterix emphasizes that successful transitions require no diminution of interference protection for incumbent narrowband systems, and it notes the Commission has proposed appropriately protective technical standards for 900 MHz broadband systems.¹⁹⁸

62. Finally, having expanded eligibility for a broadband license to include both B/ILT and SMR licensees, we decline to adopt proposals by commenters that would restrict eligibility for a broadband license to a specific subset of 900 MHz licensees. Southern California Edison encourages us to prioritize critical infrastructure industries, recommending that we establish a 12-month period in which only critical infrastructure industries are eligible for a conditional broadband license.¹⁹⁹ Duke Energy suggests that we should "limit eligibility of prospective broadband license holders in the 3/3 MHz

¹⁹⁵ 47 CFR § 90.621(b). We note that this separation distance increases for certain high site locations in California and Washington. *See id.* § 90.621(b)(2)-(3), and Short-Spacing Separation Table, n.1.

¹⁹⁶ *Id.* § 90.621(b)(4)-(5).

¹⁹⁷ A prospective broadband licensee and geographic SMR licensee are free to reach an agreement regarding the protection of any future sites the SMR licensee may construct. This in no way limits the current rights afforded to geographic SMR licensees, which have the flexibility to add or relocate transmitter sites anywhere within their market at any time as long as they observe the field strength limit at the boundary. *See id.* § 90.663.

¹⁹⁸ Anterix Reply at 5.

¹⁹⁹ *See* Letter from Donald Evans, Counsel to Southern California Edison, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200 (filed Dec. 6, 2019) (Southern California Edison Dec. 6, 2019 *Ex Parte*); *see also* Southern California Edison Reply at 4 ("... SCE suggests that utilities in a given market be given up to three years to assemble the necessary spectrum resources to create the 3 x 3 MHz band. After that, non-utility incumbents in a market would be eligible to do so."); Letter from Donald J. Evans, Counsel to Southern California Edison, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200 (filed Jan. 24, 2020); San Diego Gas & Electric Feb. 13, 2020 *Ex Parte* (supporting Southern California Edison's advocacy for priority access for critical infrastructure industry entities and utilities).

broadband spectrum and the services derived from it to the current PLMR incumbents.”²⁰⁰ Hawaiian Electric Companies comments that we should restrict eligibility to regulated, licensed utilities that own and operate critical infrastructure.²⁰¹ We find that such restrictions are contrary to our goal of allowing negotiations between existing incumbents in the 900 MHz band to drive the transition process as much as possible. We reject the idea of unnecessarily constraining participation to effectively exclude, as Southern California Edison suggests, incumbent SMRs from being the broadband licensee in a market by providing rights of first refusal to specific industries for a time period. The rules we adopt today permit a wide range of part 90 licensees to apply for a 900 MHz broadband license, including SMRs and utilities. By allowing a licensee to use any combination of 900 MHz spectrum to reach the more-than-50% spectrum eligibility criterion, rather than the *NPRM* proposal limited to 900 MHz geographically licensed SMR licensees, utilities with substantial B/ILT holdings can apply for 900 MHz broadband license. We find the public interest is served by the approach we adopt today, which allows any type of 900 MHz licensee to meet the eligibility requirements and encourages as expeditious and efficient a transition to broadband as possible.

c. Mandatory Relocation

63. We anticipate that in some markets a prospective broadband licensee will not be able to reach privately negotiated agreements to acquire, relocate, or protect incumbents prior to filing an application for a broadband license.²⁰² Among the requirements for an applicant to be eligible for a broadband license and, accordingly, for an initial 900 MHz broadband license to be granted, a prospective broadband licensee must demonstrate that it holds spectrum or has reached agreements with covered incumbents collectively holding licenses for at least 90% of the site-channels in a county and within 70 miles of the county boundary. While this approach encourages private negotiations between the prospective broadband licensee and incumbent narrowband licensees, we recognize that there is a potential for holdouts. After review of the record, we conclude that it is in the public interest to adopt a narrowly tailored mandatory relocation component triggered under certain circumstances after a 900 MHz broadband license is issued because it will facilitate a more effective transition. With the exception of complex systems, we will allow a 900 MHz broadband licensee to relocate mandatorily from the broadband segment, in a given county and within 70 miles of the county, covered incumbents’ remaining site-channels that were not covered by the broadband licensee’s agreements to reach the 90% eligibility threshold. The broadband licensee must pay all reasonable relocation costs, including providing comparable facilities to the covered incumbents it seeks to relocate mandatorily. We find that this approach to mandatory relocation of covered incumbents is appropriate, as it reduces holdouts that could block a transition to much needed broadband, while requiring the broadband license applicant to achieve a demonstrably high level of success in negotiating private agreements with incumbents before license issuance and the implementation of any mandatory relocation.

64. As we noted in the *NPRM*, a covered incumbent may have an incentive to hold out for a larger share of the gains from creating a broadband license than it individually contributes.²⁰³ Commenters suggest that a regulatory backstop, such as a narrowly tailored mandatory relocation rule, is

²⁰⁰ Duke Energy Comments at 14.

²⁰¹ Hawaiian Electric Companies Comments at 8.

²⁰² For example, Anterix, which intends to pursue broadband licenses, indicates that “[i]t has entered into a number of such agreements already in anticipation that the FCC might propose a band realignment to create a broadband option[.]” and that it “is confident that it will be able to reach voluntary agreements with the great majority of incumbents in counties where it qualifies as the prospective broadband licensee” Anterix Comments at 13.

²⁰³ 900 MHz *NPRM*, 34 FCC Rcd at 1564, para. 37.

necessary to facilitate a successful transition.²⁰⁴ UPS explains that the voluntary exchange process may result in holdouts when incumbents and prospective broadband licensees cannot agree on terms for clearing the market.²⁰⁵ As Southern California Edison states, these holdouts can occur for many reasons, including “unwillingness to experience disruption, unease about the comparability of substitute facilities, disinterest, [and] concerns about the amortization of embedded equipment[.]”²⁰⁶ EWA argues that a mandatory relocation rule is warranted because these holdouts could forestall the transition to broadband.²⁰⁷

65. We sought comment on whether to require mandatory relocation of remaining incumbents once a prospective broadband licensee meets a threshold for voluntary exchanges.²⁰⁸ Commenters generally support a mandatory relocation process that will make band realignment successful, and some specifically advocate for the adoption of the success threshold mechanism.²⁰⁹ We also sought comment on whether complex systems should be excluded from mandatory relocation.²¹⁰ We provided examples where mandatory relocation might be applied to remaining incumbents without complex systems if, during the first year of negotiation, the prospective broadband licensee reaches agreements with, or demonstrates protection to, entities controlling 90% of the channels within the 900 MHz broadband segment, with that number reduced to 80% during a second year of voluntary negotiation.”²¹¹

66. We find that adopting a single 90% threshold aligns better with our evaluation of the broadband transition in 2021 than the two year, two-tiered approach on which we sought comment in the *NPRM*. We also find that the single 90% threshold implies that the vast majority of the private negotiations were successful before mandatory relocation. We believe the 90% approach strikes the right balance between those in the record advocating for a purely voluntary realignment and those suggesting that we adopt a mandatory relocation mechanism to address the holdout issue. By permitting the 900 MHz broadband licensee to invoke mandatory relocation only after achieving the 90% threshold required for license eligibility, we place a premium on reaching agreements with covered incumbents and substantially limit the number of entities subject to mandatory relocation.

67. *Relocation Costs and Comparable facilities.* We require a broadband licensee seeking to subject a covered incumbent to mandatory relocation to pay all reasonable relocation costs, including providing the covered incumbent with comparable facilities. We find that this requirement should ensure that covered incumbents are not unduly burdened and that their operations are not inordinately disrupted if relocated from the broadband segment. We recognize that reconfiguring the 900 MHz band to provide for a transition to broadband may cause covered incumbents some inconvenience, but our goal is to ensure that the band reconfiguration process does not result in degradation of existing service or cause an adverse effect on narrowband communications and operations. We therefore adopt rules that ensure both

²⁰⁴ Anterix Comments at 13-14; Southern California Edison Reply at 5; UPS Reply at 6; Enterprise Wireless Association Reply at 2-3.

²⁰⁵ See UPS Reply at 6.

²⁰⁶ Southern California Edison Reply at 5.

²⁰⁷ See Enterprise Wireless Alliance Reply at 3; Ameren Comments at 6.

²⁰⁸ 900 MHz *NPRM*, 34 FCC Rcd at 1564, paras. 37-38.

²⁰⁹ Ameren Comments at 5-6; Anterix Comments at 10, 16-17; Anterix Reply at 8-9; Letter from Elizabeth R. Sachs, Counsel to Anterix, Inc., to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200, at 2 (filed Oct. 9, 2019) (Anterix Oct. 9 *Ex Parte*); Enterprise Wireless Alliance Comments at 7.

²¹⁰ 900 MHz *NPRM*, 34 FCC Rcd at 1564, para. 38.

²¹¹ *Id.*

continuity of service and that mandatorily relocated licensees receive “comparable facilities” at the broadband licensee’s expense.²¹²

68. In the *NPRM*, we sought comment on whether we should require broadband licensees to provide comparable facilities to mandatorily relocated incumbents and whether incumbent site-based licensees would be unduly burdened by a mandatory relocation requirement.²¹³ We sought comment on the extent to which the rules adopted as part of a revised 800 MHz band plan to resolve harmful interference to public safety systems would be appropriate for mandatory relocation in the 900 MHz band.²¹⁴ Commenters addressing this issue all agree that, in any mandatory relocation, the eventual broadband licensee must provide incumbents with comparable facilities and reimburse them for their relocation costs.²¹⁵ Specifically, Oncor states that incumbents should be permitted to receive comparable facilities providing “equivalent bandwidth and coverage for every frequency pair surrendered,”²¹⁶ and the City of Los Angeles Department of Water and Power argues that the costs of relocation must be borne in all cases by the 900 MHz broadband licensee.²¹⁷ Several commenters supporting a “comparable facilities” requirement agree the Commission’s 800 MHz band comparable facilities rules would be appropriate for the 900 MHz band.²¹⁸ Southern California Edison explains that the Commission’s current rules provide a definition of comparable facilities for the 800 MHz band, and it finds “no reason why that model could not be used for 900 MHz relocations as well.”²¹⁹

69. Based on the record and consistent with established Commission precedent, we find it appropriate to require a broadband licensee to pay all reasonable covered incumbent relocation costs,²²⁰ which includes providing comparable facilities.²²¹ A comparable facility is a replacement system provided to a covered incumbent during mandatory relocation that is at least equivalent to the incumbent’s existing 900 MHz system as it relates to four factors: (1) system, (2) capacity, (3) quality of

²¹² Provision of comparable facilities could involve, for example, retuning existing radios or providing replacement equipment.

²¹³ 900 MHz *NPRM*, 34 FCC Rcd at 1564, para. 38.

²¹⁴ *Id.* at 1566, para. 45 (citing, e.g., 47 CFR § 90.699, which was adopted in the *Upper 200 SMR Second Report and Order* and also used in proceedings such as the *800 MHz Public Safety Report and Order*). See 47 CFR § 90.699; *800 MHz Public Safety Report and Order*.

²¹⁵ See, e.g., Ameren Comments at 5; American Petroleum Institute and the Energy Telecommunications and Electrical Association Comments at 3; Anterix Reply at 8-9; City of Los Angeles Department of Water and Power Comments at 4-5; National Association of Manufacturers and MRFAC, Inc. Comments at 6; NextEra Energy, Inc. Comments at 18; Oncor Electric Delivery Company LLC Comments at 8; Utilities Technology Council Reply at 16; San Diego Gas & Electric Feb. 12, 2020 *Ex Parte*, Attach. B at 7.

²¹⁶ Oncor Comments at iii, 10.

²¹⁷ City of Los Angeles Department of Water and Power Comments at 5.

²¹⁸ Anterix Reply at 8-9; Utilities Technology Council Reply at 16 (both citing 47 CFR § 90.699).

²¹⁹ Southern California Edison Reply at 3; see also National Association of Manufacturers and MRFAC, Inc. Comments at 5; Utilities Technology Council Reply at 16.

²²⁰ *Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, Report and Order and Order of Proposed Modification, FCC 20-22, at 79-86, paras. 193-204 (2020).

²²¹ See, e.g., 47 CFR § 90.699; *Amendment of Part 90 of the Commission's Rules to Facilitate Future Development of SMR Systems in the 800 MHz Frequency Band*, Second Report and Order, PR Docket No. 93-144, 12 FCC Rcd 19079, 19112-19113, paras. 89-95 (1997) (*Upper 200 SMR Second Report and Order*); *800 MHz Public Safety Report and Order*, 19 FCC Rcd at 15077, para. 201.

service, and (4) operating costs.²²² We find that the rules we adopt are supported by the record²²³ and appropriately balance the interests of broadband licensees and covered incumbents subject to mandatory relocation.

70. We next set forth guidance for providing a comparable facility meeting these factors. A comparable system is functionally determined from the end user's point of view (i.e., base station facilities operating on an integrated basis to provide service to a common end user, and all associated mobile units). A system may operate in multiple counties and may include multiple-licensed facilities operated as a unified system if the end user can access all such facilities.

71. Comparable channel capacity requires provision of at least the same number of channels with the same bandwidth that is currently available to the end user.²²⁴ If a different channel configuration is required, it must have the same overall capacity as the original configuration, including equivalent signaling capacity, baud rate, and access time, and must achieve coextensive geographic coverage with that of the original system.

72. Comparable quality of service requires the end user to enjoy the same level of interference protection, whether providing voice and/or data services. Quality of service necessarily requires reliability, or the degree to which information is transferred accurately within the system.²²⁵ For digital data systems, this will be measured by the percent of time the bit error rate exceeds the desired value. For analog or digital voice transmissions, this will be measured by the percent of time that audio signal quality meets an established threshold.²²⁶

73. With respect to operating costs, compensable costs will include all reasonable engineering, equipment, site and FCC fees, as well as any reasonable, additional costs that the covered incumbent may incur as a result of mandatory relocation.

74. Southern California Edison recommends that the Commission adopt a rule similar to section 101.75, which places a 2% cap on certain reimbursable costs, such as engineering and FCC fees.²²⁷ Consistent with our approach in the recent C-band proceeding, rather than a hard cap, we find it

²²² We emphasize that these factors are only relevant to determining what type of facilities the broadband licensee must provide to meet the requirements for mandatory relocation, in a given county and within 70 miles of a county, of any covered incumbents' remaining site-channels that were not covered by the broadband licensee's agreements to reach the 90% threshold. We also clarify that a covered incumbent and the broadband licensee are free to negotiate any mutually agreeable alternative arrangement.

²²³ See, e.g., Ameren Comments at 5 (emphasizing that all retuning costs should be borne by the broadband licensee); American Petroleum Institute and the Energy Telecommunications and Electrical Association Comments at 3 (explaining that relocation costs can be very significant and urging the Commission to ensure full cost reimbursements); Anterix Comments at 15 (stating that "the entire cost of relocation will be borne by the BB Licensee"); Enterprise Wireless Association Comments at 6 (arguing that the licensee should assume all reasonable costs associated with the move).

²²⁴ For example, if a covered incumbent's system consists of five 25 kilohertz (12.5 kHz paired frequencies) channels, the replacement system must also have at least five 25 kilohertz channels. We do not apply to mandatory relocation agreements the 1-for-1 channel restriction in section 27.1503(a)(4) applicable to voluntary agreements between a prospective broadband licensee and a covered incumbent.

²²⁵ Reliability is a function of equipment failures (e.g., transmitters, feed lines, antennas, receivers, battery back-up power) and the availability of the frequency channel due to propagation characteristics (e.g., frequency, terrain, atmospheric conditions, radio-frequency noise).

²²⁶ We note that where an analog voice system is replaced with a digital voice system, we will consider the resulting frequency response, harmonic distortion, signal-to-noise ratio, and reliability.

²²⁷ See Southern California Edison Reply at 3 (citing the two percent cap in 47 CFR § 101.75).

reasonable to establish a rebuttable presumption that soft costs should not exceed 2% of the relocation hard costs. This way, a covered incumbent may demonstrate that any fees in excess of 2% were reasonably and unavoidably incurred—and thus properly compensable.²²⁸ Establishing a rebuttable presumption is also consistent with the Commission’s approach in the 800 MHz Rebanding proceeding, in which the Commission used 2% of the hard costs as a “useful guideline for determining when transactional costs are excessive or unreasonable”²²⁹

75. Commenters opposing mandatory relocation express concern about the costs of relocation, possible disruptions to service, and the lack of spectrum for relocation.²³⁰ Commenters generally support a requirement that the broadband licensee guarantee a seamless transition with regard to guaranteeing payment for all costs and activities.²³¹ We find that the approach adopted today of requiring the broadband licensee to pay all reasonable costs of relocating the covered incumbent to a comparable facility balances concerns of these commenters with enabling broadband services in the 900 MHz band, while providing a means to transition the band effectively and efficiently without placing an undue burden on covered incumbents. We recognize that avoiding significant disruption of incumbent service may require, for a period of time, simultaneous operation of an incumbent’s former and post-relocation systems. If a broadband licensee is either unable or unwilling to provide a covered incumbent licensee with “comparable facilities,” the incumbent would not be subject to mandatory relocation and would be able to continue narrowband operations on a primary basis in the broadband segment. In this scenario, the broadband licensee would be required to protect such covered incumbent under a private contractual agreement if the licensee is geographic-based, or under section 90.621(b) if the license is site-based.

76. *Mandatory relocation process.* A broadband licensee has the right to require mandatory relocation, in a given county and within 70 miles of the county boundary, covered incumbents’ remaining site-channels that were not covered by the broadband licensee’s agreements to reach the 90% eligibility threshold, except for complex systems. The *NPRM* sought comment on what, if any, additional requirements may be necessary to ensure an efficient and complete transition process.²³² Anterix supports a requirement that the broadband license applicant notify the remaining covered incumbent(s) of the initiation of mandatory relocation, and no party objects to such a requirement.²³³ We find it in the public interest to require a broadband licensee seeking to trigger the mandatory relocation process to serve notice

²²⁸ *Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, Report and Order and Order of Proposed Modification, FCC 20-22, at 82, para. 198 (2020); *Improving Public Safety Communications in the 800 MHz Band*, Supplemental Order and Order on Reconsideration, 19 FCC Rcd 25120, 25151, para. 70 (2004) (*800 MHz Rebanding Order on Reconsideration*) *aff’d sub nom. Mobile Relay Assocs. v. FCC*, 457 F.3d 1 (D.C. Cir. 2006).

²²⁹ *800 MHz Rebanding Order on Reconsideration*, 19 FCC Rcd at 25151, para. 70) (resolving a conflict between the *800 MHz Rebanding Order*, which required Nextel to absorb all reconfiguration costs, including transactional costs, and the rule provision incorporated by reference that limited transaction costs to no more than 2% of the hard costs involved).

²³⁰ See American Petroleum Institute and the Energy Telecommunications and Electrical Association Comments at 3; City of Los Angeles Department of Water and Power Comments at 3-4; Critical Infrastructure Coalition Comments at 3, 4; Duke Energy Comments at 3, 11; Lower Colorado River Authority Comments at 3-9; Lower Colorado River Authority Reply at 2-3; 10-16; Lower Colorado River Authority Aug. 19, 2019 *Ex Parte* at 1; National Association of Manufacturers and MRFAC, Inc. Comments at 3; NextEra Energy, Inc. Comments at 9-10; NextEra Energy, Inc. Reply at 1; Oncor Electric Delivery Company LLC Comments at 4-5.

²³¹ Enterprise Wireless Alliance Comments at 3; City of Los Angeles Department of Water and Power Comments at 4-5, 11; Anterix Comments at 10; UPS Comments at 15, 17.

²³² *900 MHz NPRM*, 34 FCC Rcd at 1564, para. 37.

²³³ See Anterix Reply at 14.

on a covered incumbent that it plans to relocate mandatorily.²³⁴ This approach is consistent with the 800 MHz requirement that notice be provided before mandatory relocation could be triggered,²³⁵ and is necessary to ensure covered incumbents subject to mandatory relocation have sufficient information and notice to factor relocation into their respective business plans.

77. Following the service of notice, the broadband licensee may request information from the covered incumbent that is reasonably required for it to develop its offer of comparable facilities.²³⁶ We agree with commenters supporting a good faith requirement for mandatory relocation negotiations,²³⁷ and we expect all parties to negotiate with the utmost good faith during the mandatory relocation process,²³⁸ including each party providing information to the other that is reasonably necessary to facilitate mandatory relocation. Where all parties have acted in good faith, a covered incumbent must accept a broadband licensee's offer that does in fact cover reasonable relocation costs and provide comparable facilities, or else it must accept responsibility itself for transitioning to new facilities on the same timeline.

78. Where disputes between parties to mandatory relocation arise, we direct the Wireless Telecommunications Bureau (Bureau) to, in the first instance, resolve disputes. A party seeking Commission resolution of a dispute must submit in writing to the Chief, Wireless Telecommunications Bureau: (a) the name, address, telephone number, and email address of the licensee or incumbent making the allegation; (b) the name of the licensee or incumbent about which the allegation is made; (c) a complete statement of the facts supporting the broadband licensee's or incumbent's claim; and (d) the specific relief sought. If an incumbent fails to negotiate in good faith, its license may be modified accordingly by the Commission pursuant to Section 316 of the Act to reflect operational authority for new channels outside the broadband segment.²³⁹ We anticipate that the Bureau would issue, if in the public interest, any orders of proposed modification and orders of modification.²⁴⁰ We also note that if the Bureau finds bad faith, for example, on the part of the broadband licensee, the broadband licensee may lose the right to relocate the covered incumbent and/or the Bureau may refer the matter to the Enforcement Bureau for further action (which could include a range of sanctions, such as imposition of forfeitures).

79. *Complex system exemption.* We find it in the public interest to exempt complex systems from mandatory relocation. We define a complex system as a covered incumbent's system consisting of

²³⁴ This notice must be served in compliance with 47 CFR § 1.47.

²³⁵ See *Upper 200 SMR Second Report and Order*, 12 FCC Rcd at 19187-89 (revising 47 CFR § 90.699(b)(2) related to mandatory negotiations for the transition of the upper 200 channels in the 800 MHz band to EA licensing).

²³⁶ See *800 MHz Public Safety Report and Order*, 19 FCC Rcd at 15076, para. 201 n.524. The broadband licensee also may include its offer of comparable facilities at the time of service of notice of mandatory relocation if it believes it has all information required to make a good faith offer.

²³⁷ See *Anterix Comments* at 14-15; *National Association of Manufacturers and MRFAC, Inc. Comments* at 6-7; *Southern California Edison Comments* at 18.

²³⁸ See *800 MHz Public Safety Report and Order*, 19 FCC Rcd at 15076, para. 201. Among the factors relevant to a good-faith determination are: (1) whether the party responsible for paying the cost of band reconfiguration has made a *bona fide* offer to relocate the incumbent to comparable facilities; (2) the steps the parties have taken to determine the actual cost of relocation to comparable facilities; and (3) whether either party has unreasonably withheld information, essential to the accurate estimation of relocation costs and procedures, requested by the other party. See *id.* at 15076, n.524 (citing *Amendment to the Commission's Rules Regarding a Plan for Sharing the Costs of Microwave Relocation*, First Report and Order and Further Notice of Proposed Rulemaking, WT Docket No. 95-157, 11 FCC Rcd 8825, 8837-38, para. 21 (1996)).

²³⁹ 47 U.S.C. § 316.

²⁴⁰ See *800 MHz Public Safety Report and Order*, 19 FCC Rcd at 15077, para. 201.

45 or more functionally integrated sites. Such systems are of considerable size and technical complexity and are often deployed over wide areas with sites that are functionally reliant on each other. We believe the 45-site minimum captures the types of systems that in fact are functionally integrated by design and that would require simultaneous relocation to maintain network functionality. A clear example of a complex system is one with at least 45 fixed sites that are connected to a central switch/system and operate as part of a system, similar to a cellular network. In contrast, a system would not be complex if it consisted of disparately located transmitter sites (for example, separate business plants) having no direct communications and where relocation of frequencies used at one site would have no impact on the communications of other sites, even if such a system consisted of 45 or more sites.

80. In the *NPRM*, we sought comment on whether we should exempt from mandatory relocation covered incumbents with complex systems, and we provided an example of a system consisting of 65 or more integrated sites.²⁴¹ Several commenters support an exemption from the mandatory relocation requirement for complex systems.²⁴² Lower Colorado River Authority explains that an exemption for complex systems is warranted because these systems “would not fit within a 2/2 MHz narrowband allocation and would suffer harmful interference if forced to relocate to the compressed narrowband segments.”²⁴³

81. Most commenters addressing mandatory relocation support an exemption for complex systems, and no commenters specifically object to such an exemption.²⁴⁴ Most commenters addressing the issue of integrated sites focus on the central control element of a network of sites.²⁴⁵ Only two entities support defining a complex system as 65 or more sites.²⁴⁶ Many commenters argue that a 65 site threshold is too restrictive and that the exemption should capture systems with “complex considerations

²⁴¹ 900 MHz *NPRM*, 34 FCC Rcd at 1564, para. 38.

²⁴² See Anterix Comments at 17-18; American Petroleum Institute and the Energy Telecommunications and Electrical Association Comments at 3; Lower Colorado River Authority Comments at i, 2-9; NextEra Energy, Inc. Comments at 3.

²⁴³ Lower Colorado River Authority Comments at 2.

²⁴⁴ See, e.g., Anterix Comments at 17; Anterix Reply at 9; Association of American Railroads Reply at 6; Critical Infrastructure Coalition Comments at 4; Enterprise Wireless Alliance Reply at 3; Lower Colorado River Authority Comments at 10; Lower Colorado River Authority Reply at 3, 4-6, 8; NextEra Energy, Inc. Comments at 21-22; NextEra Energy, Inc. Reply at 3; San Diego Gas & Electric Feb. 13, 2020 *Ex Parte*; NextEra Jan. 31, 2020 *Ex Parte* at 2; Southern Company Reply at 9; Southern California Edison Comments at 6; Utilities Technology Council Comments at 21; Utilities Technology Council Reply at 14-15.

²⁴⁵ See Anterix Comments at n.54 (“[Anterix] assumes the term ‘integrated sites’ means sites that operate functionally as part of a related network of sites.”); Utilities Technology Council Comments at 21 (“UTC suggests removing the term ‘integrated’ and simply refer to the number of sites in the system as the basis for the exclusion. Alternatively, UTC suggests defining ‘integrated’ systems as being centrally controlled.”). NextEra Energy, Inc. Comments at 21 (“NextEra recommends that the criteria . . . include: a) a system ultimately controlled by a single entity that has a central means of controlling the entire system that is integrated together through a network that allows for operability across all sites. . . [and] b) an aggregation of systems authorized to separate licensees that . . . may span large geographic regions while bridging together non-contiguous areas, and may have large channel capacity on a site by site basis.”).

²⁴⁶ Letter from Michael D. Rosenthal, Counsel to Southern Linc, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200, at 2 (filed Dec. 11, 2019); Anterix Comments at 17; Anterix Reply at 10; Letter from Elizabeth R. Sachs, Counsel to Anterix, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200, at 1 (filed July 22, 2019); Letter from Elizabeth R. Sachs, Counsel to Anterix, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200, at 2 (Aug. 30, 2019); Letter from Elizabeth R. Sachs, Counsel to Anterix, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200 at 2 (filed Sept. 17, 2019).

and not just ‘hold outs’ that could easily relocate.”²⁴⁷ The City of Los Angeles Department of Water and Power points to the record to suggest that the Commission should lower the threshold number from 65 sites, thereby expanding the scope of the exemption.²⁴⁸ Lower Colorado River Authority and NextEra suggest that a threshold of 45 or more sites may be appropriate.²⁴⁹ NextEra also suggested the following definition for complex systems: “900 MHz site-based system that consists of 45 or more narrowband sites licensed prior to the date of Federal Register publication of the Report and Order, if such sites are interconnected or otherwise integrated to support critical service operations in a geographic area either within a single State or segments of territory in multiple States.”²⁵⁰ Some commenters discussing the complex system exemption recommend that the minimum number of functionally integrated sites required to qualify should be 25.²⁵¹

82. We find that an exemption for complex systems is warranted due to the engineering complexities involved in relocating large systems. Most networks that would be covered by the complex system exemption include large utilities and other entities that would be especially harmed by any incremental network relocation, and such relocation would require particularly detailed engineering plans impacting the entire network. The American Petroleum Institute and the Energy Telecommunications and Electrical Association urge the Commission to exempt certain systems from mandatory relocation where the licensee deems doing so unfeasible or unduly burdensome.²⁵² For example, they estimate that relocation costs could be upwards of \$10 million for a large petrochemical plant if existing narrowband radios must be replaced rather than retuned.²⁵³ In addition, they argue that such relocations may not

²⁴⁷ Utilities Technology Council Comments at 21.

²⁴⁸ City of Los Angeles Department of Water and Power Reply at 5.

²⁴⁹ Letter from Kevin M. Cookler, Counsel to Lower Colorado River Authority, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 17-200, at 1 (filed Dec. 12, 2019) (Lower Colorado River Authority Dec. 12, 2019 *Ex Parte*); Letter from Kevin M. Cookler, Counsel to Lower Colorado River Authority, to Marlene H. Dortch, WT Docket No. 17-200, at 1 (filed Apr. 16, 2020); Letter from Timothy J. Cooney and Jennifer B. Tatel, Counsel to NextEra, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 17-200, at 4-5 (filed Dec. 16, 2019) (NextEra Dec. 16, 2019 *Ex Parte*); Letter from Timothy J. Cooney, Counsel to NextEra, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 17-200, at 1 (filed Jan. 27, 2020) (*NextEra Complex System Procedure Ex Parte*).

²⁵⁰ *NextEra Complex System Procedure Ex Parte*. NextEra also advocated for a 25 site threshold. See Letter from Bryan N. Tramont, Counsel to NextEra Energy, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200 (filed Jan. 31, 2020) (NextEra Jan. 31, 2020 *Ex Parte*) (suggesting a preference for a 25 site threshold). In its Reply Comments, NextEra contended that “[t]he lower threshold of 25 sites will allow for a better balance to protect critical narrowband systems while encouraging a voluntary market-based transition to broadband in certain markets.” NextEra Energy, Inc. Reply at 17.

²⁵¹ See Critical Infrastructure Coalition Comments at 9; Jackson Electric Membership Corporation Reply at 2; Lower Colorado River Authority Comments at 10, 11; Lower Colorado River Authority Reply at 3, 5; Lower Colorado River Authority Aug. 19, 2019 *Ex Parte*; Letter from Kevin M. Cookler, Counsel to Lower Colorado River Authority, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200, at 2 (filed Nov. 22, 2019); Lower Colorado River Authority Dec. 12, 2019 *Ex Parte*; NextEra Energy, Inc. Comments at 21; NextEra Energy, Inc. Reply at 3; NextEra Dec. 16, 2019 *Ex Parte* (providing an example of a 25-site system that NextEra claims is complex); NextEra Jan. 31, 2020 *Ex Parte* at 2 (indicating that NextEra preferred a 25-site threshold even though it suggested a definition of 45 sites); Utilities Technology Council Comments at 21; Utilities Technology Council Reply at 14-15; San Diego Gas & Electric Feb. 13, 2020 *Ex Parte*; Southern California Edison Reply at 7 (suggesting a complex system exemption “when more than 25 incumbent channels belonging to a single operator require relocation”); Southern California Edison Dec. 6, 2019 *Ex Parte* (in the context of Southern California Edison’s proposal for priority access for the critical infrastructure industry, it suggested that a system with “25 unique channels or 25 sites” should be considered complex).

²⁵² American Petroleum Institute and the Energy Telecommunications and Electrical Association Comments at 3.

²⁵³ American Petroleum Institute and the Energy Telecommunications and Electrical Association Comments at 3.

involve simple retunings, “but may require footprint adjustments to ensure coverage is maintained and interference is minimized.”²⁵⁴ Lower Colorado River Authority agrees that a complex systems exemption is warranted, particularly in instances where a narrowband system is shared with public safety users, which increases the complexity of the system and complicates mandatory relocation.²⁵⁵

83. We find that adopting a 45 site-threshold strikes the appropriate balance between these interests, as this threshold both protects from mandatory relocation systems that are inherently complex and serves to facilitate the 900 MHz band transition in as many markets as possible. Although we sought comment in the *NPRM* on a 65-site threshold that would clearly capture the nation’s most complex networks, we seek to limit the instances where the broadband licensee, having negotiated agreements with most covered incumbents in a market, is blocked from fully transitioning a market to broadband. At the same time, we seek to provide a clear line that affords flexibility for large incumbent licensees to make necessary network changes without loss of complex system status. In that regard, we are not persuaded by those commenters that propose, but failed to provide support for, a 25-site threshold as the most appropriate.

84. We clarify that SMR (site-based and/or geographic) and B/ILT licensees may have systems that qualify as complex and that, to qualify as a complex system, not all 45 sites must be located within the county and/or within 70 miles of the county boundary where a prospective licensee is interested in deploying 900 MHz broadband. A complex system with a single site (of its 45 or more functionally integrated sites) located within the county or within 70 miles of the county boundary is exempt from mandatory relocation. We also clarify that a site-based incumbent’s status as a complex system as reflected in ULS will be determined as of the date of the adoption of this *Report and Order*. Unlike site-based SMR and B/ILT licenses that reflect specific site locations in ULS, geographic SMR licenses specify the geographic area within which a licensee may construct transmitter sites, and these sites are not reflected in ULS. We therefore clarify that a geographic SMR incumbent’s status as a complex system will be determined by the number of functionally integrated sites that are operational as of the date of adoption of this *Report and Order*. We find it appropriate to place the burden on the broadband licensee to determine whether a geographic SMR license is operating a complex system by having operational sites within the country and/or within 70 miles of the county boundary.

85. We recognize that some commenters expressed a concern that calculating complex system status at a future date might decrease licensee network design flexibility.²⁵⁶ For example, a licensee with 46 sites may be reluctant to maximize efficiencies that might reduce its number of sites to 44 for fear of losing complex system status under a 45 site threshold and therefore being subject to mandatory relocation. With today’s approach, we provide licensees with certainty regarding when complex status is determined. With this certainty, licensees that qualify as of the date of adoption of this *Report and Order* may make network adjustments that reduce the number of functionally integrated sites without losing complex system status. On the other hand, licensees falling short of the 45-functionally-integrated-site threshold as of the date of adoption of this *Report and Order* will not be considered complex, regardless of future site expansion. This approach will permit licensees to make ordinary business decisions regarding network configuration and will also prevent gaming in network design to avoid mandatory relocation.

86. Some commenters contend that the definition of complex systems should be expanded to include, for example, “any system that is shared by the B/ILT licensee with public safety users or other eligible entities pursuant to Section 90.179; or [] any system that is authorized for an extended

²⁵⁴ *Id.* at 3.

²⁵⁵ Lower Colorado River Authority Comments at 11-12; *see also* NextEra Energy, Inc. Comments at 21-22; Utilities Technology Council Comments at 21-22; Anterix Comments at 17.

²⁵⁶ Lower Colorado River Authority Dec. 12, 2019 *Ex Parte*, at 1.

implementation period pursuant to Section 90.629.”²⁵⁷ NextEra Energy contends that we should exempt the entire Florida peninsula or the entire state of Florida from potential mandatory relocation “because of the narrowness of the Florida peninsula.”²⁵⁸ We decline to further expand the scope of the complex system exemption. We recognize that, to transition a county with a complex system and be operational, a broadband licensee will likely have reached an agreement with the complex system licensee to relocate or protect its sites. We are not persuaded that further expanding the exemption provides public interest benefits that would outweigh potentially decreasing the number of counties ultimately transitioned to broadband.

87. Lower Colorado River Authority urges the Commission to appoint a “neutral, third-party transition administrator to oversee any relocation mechanism,”²⁵⁹ but does not address why such oversight would be appropriate. We find no basis for appointing a third-party to oversee a negotiation-based transition. We are similarly not persuaded that a single third-party frequency coordinator or transition administrator is required to oversee the negotiation or mandatory relocation process. Where disputes or allegations of bad faith arise in mandatory negotiations, we find that our delegation to the Wireless Telecommunications Bureau for expeditious adjudication best serves the public interest. We also anticipate that frequency coordinators will be able to work successfully with both incumbent licensees and broadband licensees to ensure that 900 MHz licensees are relocated to appropriate frequencies.

88. Finally, just as we decline to set fixed time limits on the negotiation-based transition, including the broadband licensee’s ability to negotiate with incumbents to reach the 90% success threshold, we also decline to set a time limit on the mandatory relocation period, as some commenters suggest.²⁶⁰ In the 800 MHz context, mandatory timeframes were established in the interest of resolving interference to public safety networks,²⁶¹ or involved an overlay of auctioned licenses to facilitate the relocation of incumbent site-based licensees during the 800 MHz Upper 200 channel SMR relocation.²⁶² Here, we rely on a negotiation-based approach to allow the broadband licensee and 900 MHz incumbents to determine the appropriate timing for transitioning each market, rather than the Commission imposing a specific timeframe. The approach we adopt today may only be an initial part of a transition process, given our 2021 evaluation of the status of the 900 MHz broadband transition to determine whether additional steps might be necessary to effectuate a more widespread transition, including potentially an auction of overlay licenses.

d. Anti-Windfall Provisions

89. To mitigate a potential windfall to a broadband licensee and consistent with the record,²⁶³

²⁵⁷ Lower Colorado River Authority Comments at 10 (citing 47 CFR §§ 90.179, 90.629). *See also* NextEra Energy, Inc. Comments at 21 (“NextEra recommends that the criteria for being considered a ‘complex system’ excluded from potential mandatory relocation include . . . a system that involves direct communications to the public for high risk alerts with direct ties to public wellbeing. A siren/public notification system that operates in a radius of 10 miles of a nuclear power plant is an example of this.”). Some commenters urge us to permit systems to span counties and to deem a system complex “regardless of geographic continuity.” NextEra Energy, Inc. Comments at 21; Critical Infrastructure Coalition Comments at 9.

²⁵⁸ NextEra Jan. 31, 2020 *Ex Parte* at 2.

²⁵⁹ Lower Colorado River Authority Reply at 19.

²⁶⁰ *See* Hawaiian Electric Comments at 8; Southern California Edison Comments at 10-11; UPS Comments at 19.

²⁶¹ *800 MHz Public Safety Report and Order*, 19 FCC Rcd at 15076, para. 201.

²⁶² *Upper 200 SMR Second Report and Order*, 12 FCC Rcd at 19187-88 (revising section 90.699) (*see* 47 CFR § 90.699(b)(2)).

we require that the applicant must return to the Commission all of its licensed 900 MHz narrowband SMR and B/ILT spectrum, up to six megahertz, for any county in which it seeks a broadband license. This requirement reduces the amount of spectrum in the Commission's inventory that is needed to grant a broadband segment license. The broadband segment consists of six megahertz of spectrum (three megahertz paired). In a county where the prospective broadband licensee holds less than six megahertz of narrowband spectrum, the differential would be made up from Commission inventory. We seek to facilitate a band transition through successful private negotiations, but we risk providing the broadband licensee with an undue windfall if we issue a broadband license while allowing the licensee to also retain its narrowband 900 MHz licenses.

90. In most markets, the Commission would be issuing a license for six megahertz of contiguous broadband spectrum to an applicant that would have relinquished less than six megahertz of non-contiguous, narrowband spectrum. In these cases, the broadband licensee would be receiving spectrum that was in the Commission's inventory at the time it filed its broadband license application. We find it in the public interest to require the broadband license applicant to make an anti-windfall payment that will compensate the U.S. Treasury for spectrum assigned from the Commission's inventory. Specifically, whenever a broadband license applicant relinquishes less than six megahertz of spectrum in exchange for receiving a six megahertz broadband license, it must make a monetary payment to the U.S. Treasury, prior to the grant of a 900 MHz broadband license, to account for the spectrum differential provided from the Commission's inventory.²⁶⁴

91. The *NPRM* noted that the proposed exchange approach of realigning the band runs the risk of creating an undue windfall for prospective broadband licensees, and the *NPRM* sought comment on what actions might be necessary to mitigate such risks.²⁶⁵ Many commenters express a concern about a potential windfall,²⁶⁶ while Anterix suggests that the resulting benefit of transitioning to broadband outweighs any windfall.²⁶⁷

92. We find that it is consistent with past Commission practice to collect anti-windfall payments when the Commission issues spectrum from inventory to an entity in order to accomplish a band reconfiguration. In particular, the 800 MHz proceeding provides guidance on the reasons why an anti-windfall payment serves the public interest in situations, such as here, in which a prospective licensee receives spectrum from Commission inventory in exchange for a commitment to transition a band in a manner that benefits the public interest.²⁶⁸ In the 800 MHz proceeding, the Commission rejected concerns that assigning Nextel spectrum rights from Commission inventory as part of a comprehensive solution to 800 MHz interference issues would be unfair because Nextel would be "receiving 'free'

²⁶⁴ We require a broadband license applicant to relinquish no more than six megahertz of its 900 MHz narrowband spectrum, and therefore application of the anti-windfall formula will not result in anti-windfall credits or any negative windfall. We clarify that a prospective broadband licensee holding more than six megahertz of 900 MHz narrowband spectrum in a county is not permitted to return excess spectrum to the Commission as a credit towards any anti-windfall payment but may use its excess spectrum to relocate covered incumbents.

²⁶⁵ *900 MHz NPRM*, 34 FCC Rcd at 1562, para. 34.

²⁶⁶ See City of Los Angeles Department of Water and Power Comments at 5; Hawaiian Electric Companies Comments at 2; Lower Colorado River Authority Comments at 20; NextEra Energy, Inc. Reply at 11; San Diego Gas & Electric Feb. 13, 2020 *Ex Parte*, Attach. B at 6.

²⁶⁷ See Anterix Comments at 22-24. Anterix relies on three instances where the Commission modified a license's usage characteristics, thereby increasing value, rather than a direct increase in the amount of spectrum licensed.

²⁶⁸ See *800 MHz Public Safety Report and Order*, 19 FCC Rcd at 15017, para. 76, *aff'd on other grounds*, *Mobile Relay Assocs. v. FCC*, 457 F.3d 1 (D.C. Cir. 2006).

spectrum while its competitors must bid for spectrum at auction.”²⁶⁹ Contrary to such claims, the Commission found that the reconfiguration obligations it placed on Nextel, including provisions for a potential anti-windfall payment, would ensure that the public received the full benefit of the reconfiguration in exchange for making other spectrum available to Nextel.²⁷⁰

93. To calculate the anti-windfall payment, we first would determine the difference between the amount of spectrum, in kilohertz or megahertz, relinquished by the broadband license applicant in the relevant county and the six megahertz of a 900 MHz broadband license. Next, we would calculate the dollars per MHz-pop prices for the 600 MHz auction based on the final forward auction prices for a generic 10 megahertz license in each PEA.²⁷¹ We would then multiply the difference in the amount of spectrum by the 2010 county population estimates and the calculated dollars per MHz-pop price of 600 MHz spectrum in the county to arrive at the anti-windfall payment for that county.²⁷² We find that 600 MHz and 900 MHz spectrum characteristics, including propagation characteristics, are sufficiently similar to justify application of 600 MHz auction prices to 900 MHz broadband license anti-windfall payments. No commenters addressed the calculation methodology for a potential anti-windfall payment.

94. For example, if an eligible 3/3 megahertz broadband license applicant holds a total of 5 megahertz of 900 MHz spectrum in Santa Fe County, New Mexico, we would require an anti-windfall payment for 1 megahertz of 900 MHz broadband segment spectrum in Santa Fe County. Applying our formula to the Santa Fe County example, the licensee would owe an anti-windfall payment of \$86,969.²⁷³

95. We find that the Commission has broad spectrum management and licensing authority to require a mandatory anti-windfall payment.²⁷⁴ The Commission has repeatedly used this authority to impose conditions on new licensees, including relocation payments, buildout conditions, public safety obligations, and obligations to facilitate the transition of incumbents of the spectrum at issue before commencing operations.²⁷⁵ We also find the anti-windfall payment is a necessary component of our

²⁶⁹ See *id.* at 15081-82, para. 214. However, we note that not all of the public interest arguments for the 800 MHz band would apply to the 900 MHz band. First, in that case, Nextel (the only incumbent subject to the mandatory anti-windfall payment) had offered to make a payment as part of its self-styled Consensus Plan for realigning the 800 MHz band. Second, in adopting a realignment plan, the Commission relied heavily on the fact that the mandatory anti-windfall payment “allows us to address the interference problems in the 800 MHz band and provide public safety agencies with additional spectrum rights in a way that places Nextel in a comparable position to that which it now occupies.” *Id.* at 15017, para. 76.

²⁷⁰ *Id.*

²⁷¹ See Federal Communications Commission, *Incentive Auction Dashboard* <https://auctiondata.fcc.gov/public/projects/1000> (last visited Mar. 30, 2020) for the final forward auction bids for a generic 10 megahertz license in each PEA and the 2010 Census population totals for each PEA.

²⁷² We note that we would apply the same dollars per MHz-pop price to all counties within a PEA. For this calculation we will use the 2010 Census population estimates by county (“poestimate2010”) available at U.S. Census Bureau, *Population Estimate Dataset*, <https://www2.census.gov/programs-surveys/popest/datasets/2010-2018/counties/totals/> (last visited Mar. 30, 2020) and the assignment of counties to PEAs available at Federal Communications Commission, *FCC Areas* (updated June 30, 2016), <https://www.fcc.gov/oet/maps/areas>.

²⁷³ We calculated an implied price for 600 MHz spectrum in Santa Fe County of \$0.601748 MHz-pop and the 2010 population estimate for this county is 144,528.

²⁷⁴ 47 U.S.C. § 303(r) (“Except as otherwise provided in this Act, the Commission from time to time, as public convenience, interest, or necessity requires, shall . . . [m]ake rules and regulations and prescribe such restrictions and conditions, not inconsistent with law, as may be necessary to carry out the provisions of this [Act]); see also *id.* § 154(i) (authorizing the Commission to “perform any and all acts, make such rules and regulations, and issue such orders, not inconsistent with this [Act], as may be necessary in the execution of its functions”).

²⁷⁵ *Id.* §§ 154(j), 301, 303(r), 309; see also *Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, Report and Order and Order of Proposed Modification, FCC 20-22, at 73-74, paras. 179-80 (2020); *Mobile Communications Corp. of*

(continued....)

exercise of statutory responsibility to grant an initial license under section 309 in accordance with the public interest, convenience, and necessity,²⁷⁶ because it will enable the conversion of narrowband to broadband licensing—an initiative that we have determined will result in the most efficient use of spectrum to best serve the public interest—while ensuring that participants are in fact engaging in this conversion in an effort to increase efficient spectrum use and not merely acquire more spectrum. We note that we received no comments on our legal authority to require an anti-windfall payment.

3. Preventing Disruption to Railways and Order Proposing Modification

96. The Association of American Railroads (AAR) holds a nationwide ribbon license surrounding railroad rights-of-way in six paired 12.5 kilohertz wide channels of the 900 MHz band, totaling 150 kilohertz.²⁷⁷ The ribbon is a 140-mile swath that tracks the railroad rights-of-way in the continental United States.²⁷⁸ Three of AAR's paired channels fall in one of the new narrowband segments and three of its paired channels fall within the new broadband segment.²⁷⁹ AAR uses its nationwide ribbon license for railroad safety, such as directing control of wayside track switches and signals, ensuring proper train routing and speed, and maintaining electromagnetic tags to track operations.²⁸⁰ AAR has approximately 9,500 transceivers in operation,²⁸¹ with multiple base stations covering a trackside switch or signal for redundancy.²⁸²

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America v. FCC, 77 F.3d 1399 (D.C. Cir. 1996) (upholding the Commission's authority under 47 U.S.C. §§ 154(i), 309(a), to condition the grant of a license on payment).

²⁷⁶ 47 U.S.C. § 309.

²⁷⁷ See FCC Call Sign WPSF894; *2001 AAR Modification Order*, 16 FCC Rcd at 3082, para. 10. See also *900 MHz NPRM*, 34 FCC Rcd at 1556, para. 16, n. 44. AAR holds a license in the following 900 MHz channels: 896.8875/935.8875 MHz, 896.9375/935.9375 MHz, 896.9875/935.9875 MHz, 897.8875/936.8875 MHz, 897.9375/936.9375 MHz, and 897.9875/936.9875 MHz. AAR operates in the continental United States.

²⁷⁸ See FCC Call Sign WPSF894; *2001 AAR Modification Order*.

²⁷⁹ The 896.8875/935.8875 MHz, 896.9375/935.9375 MHz, and 896.9875/935.9875 MHz channels held by AAR fall within the new 896.0-897.5/935.0-936.5 MHz narrowband segment. The 897.8875/936.8875 MHz, 897.9375/936.9375 MHz, and 897.9875/936.9875 MHz channels held by AAR fall within the new 897.5-900.5/936.5-939.5 MHz broadband segment.

²⁸⁰ AAR Comments at 2; AAR NOI Comments 3-4.

²⁸¹ Letter from David L. Martin, Counsel to AAR, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200, at 1 (filed May 28, 2019); AAR Comments at 2-3; AAR Reply at 2.

²⁸² AAR Comments at 5.

97. AAR has operated its nationwide system since 1988.²⁸³ From 1988 to 2001, AAR operated the system using over three hundred site-based PLMR licenses under a waiver of several sections of our rules.²⁸⁴ In 2001, AAR consolidated its 900 MHz licenses into the single nationwide ribbon license that it holds and still operates under waiver authority today.²⁸⁵ A single nationwide ribbon license for AAR remains important for myriad reasons, including increased public safety benefits, administrative efficiency for AAR and the Commission, and increased flexibility to AAR.²⁸⁶

98. The record reflects that, given AAR's prominent incumbency status in the proposed 900 MHz broadband segment, were AAR to not relocate its nationwide ribbon license from that segment, there would be virtually no county where a broadband license could be issued.²⁸⁷ In their comments, Anterix and AAR suggest a solution to AAR's incumbency in the new broadband segment.²⁸⁸ Anterix expressed a willingness to contribute a nationwide footprint of certain 900 MHz SMR spectrum holdings to facilitate AAR's relocation.²⁸⁹ AAR has stated that it and its member railroads would pay the full relocation costs (approximated at \$70 million) if the Commission were to authorize use of 250 kilohertz by modifying its 900 MHz nationwide ribbon license.²⁹⁰

99. We find it in the public interest to facilitate AAR's relocation to the narrowband segment, thereby removing a nationwide incumbent from the new 900 MHz broadband segment while maintaining its critical railroad operations.²⁹¹ We note that Anterix has committed to relinquish voluntarily its nationwide footprint of geographically based 900 MHz SMR licenses, in an effort to clear AAR from the broadband segment should Anterix become a 900 MHz broadband licensee.²⁹² In light of this commitment, we propose to modify AAR's license pursuant to our authority under section 316 of the Communications Act²⁹³ to vacate the broadband segment and provide AAR 250 kilohertz of narrowband segment channels on its nationwide ribbon license.²⁹⁴ For the reasons discussed below, we find that the proposed modification of AAR's license to authorize operation only in the narrowband segment would serve the public interest by furthering the Commission's overarching goals for reconfiguration of the 900 MHz band, and maintaining the beneficial public safety and administrative characteristics of AAR's

²⁸³ See *Waiver of Sections 90.621(d), 90.623(a), 90.629, 90.633, and 90.651(c) of the Commission's Rules to License Use of Six Conventional 900 MHz Frequency Pairs for an Advanced Train Control System*, Order, 3 FCC Rcd 427 (1988 AAR Waiver Order).

²⁸⁴ See *2001 AAR Modification Order*; *1988 AAR Waiver Order*.

²⁸⁵ See *2001 AAR Modification Order*.

²⁸⁶ *2001 AAR Modification Order*, 16 FCC Rcd at 3080-81, para. 7; AAR Comments at 4.

²⁸⁷ The AAR nationwide ribbon license includes a 70-mile protection zone on either side of the railroad tracks, effectively covering the entire United States and prohibiting any chance of sharing the same frequencies.

²⁸⁸ AAR Comments at 9-10; AAR Reply at 5; Anterix Comments at 30.

²⁸⁹ See Anterix Comments at 30; Letter from Elizabeth R. Sachs, Counsel to Anterix, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200 (filed Dec. 13, 2019); see also AAR Comments at 9-10, AAR Reply at 5.

²⁹⁰ AAR Comments at 10.

²⁹¹ Anterix Comments at 29-31; AAR Comments at 9-10.

²⁹² Anterix has committed to cancel its existing holdings and the license it has set forth to acquire, as listed in Appendix E. See Letter from Elizabeth R. Sachs, Counsel to Anterix, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200 (filed Dec. 13, 2019).

²⁹³ 47 U.S.C. § 316.

²⁹⁴ Following license modification, AAR would be licensed for use of a paired wideband 125 kilohertz channel in the narrowband segments at 896-896.125/935-935.125 MHz.

single nationwide license.²⁹⁵

100. *First*, a key goal of this proceeding is to provide additional spectrum for broadband deployment while preserving spectrum for incumbent use, and the proposed AAR license modification furthers this policy goal.²⁹⁶ We find that the proposed modification of AAR's license facilitates its relocation from the broadband segment, thereby removing a nationwide incumbent that effectively could block the transition to broadband in most counties nationwide. AAR operates a nationwide system, and without providing AAR increased channel capacity to facilitate relocation, the 900 MHz realignment is unlikely to succeed.

101. *Second*, we find AAR's planned future use of 250 kilohertz will enable significant railroad safety upgrades. A 125 kilohertz paired wideband channel provides more data throughput and is more spectrally efficient than AAR's current use of six paired non-contiguous 12.5 kilohertz channels.²⁹⁷ The proposed modification would allow AAR to upgrade its network with additional features that are not supported on its current network. For example, wideband channel operations would allow AAR to add services such as advanced defect detection (e.g., thermal imaging), increased support for rail integrity monitoring, increased oversight of maintenance activities, and continuous monitoring of highway grade crossing equipment.²⁹⁸ Moreover, a paired wideband channel allows implementation of redundant paths for PTC base station backhaul, especially in remote areas and difficult terrain.²⁹⁹ We recognize that AAR cannot use the 125 kilohertz paired contiguous wideband channel to provide full broadband functionality, but the proposed modification of AAR's license can facilitate implementation of railroad safety upgrades.

102. *Third*, the proposed modification of AAR's license in conjunction with 900 MHz band realignment to facilitate broadband would provide a unique opportunity for AAR to deploy innovative services that benefit public safety. AAR is currently confronted with challenges in upgrading its members' networks because AAR operates 9,500 transceivers across the United States under a waiver of several Commission rules.³⁰⁰ As a result, AAR cannot easily acquire additional spectrum in a nationwide footprint or innovate on its existing six narrowband non-contiguous channels.³⁰¹ Moreover, AAR operates 1980s technology, and likely would continue to do so if limited to its current channels after 900 MHz reconfiguration.³⁰² We find that the proposed modification of AAR's license will simultaneously facilitate the 900 MHz band reconfiguration and enable AAR to upgrade its members' communications networks.

103. *Fourth*, the proposed modification would "ensure the Commission is made spectrally whole"³⁰³ because Anterix would voluntarily relinquish the same amount of 900 MHz spectrum across the continental United States as that issued to AAR after license modification. As a result, the proposed

²⁹⁵ AAR Comments at 5; AAR Reply at 7.

²⁹⁶ See 900 MHz NPRM, 34 FCC Rcd at 1555, para. 14, 1563, 36.

²⁹⁷ AAR Comments at 7-8; Letter from David L. Martin, Counsel to AAR, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200, at 1-2 (filed Oct. 2, 2019).

²⁹⁸ AAR Comments at 7-8.

²⁹⁹ *Id.* at 8.

³⁰⁰ Anterix Comments at 30; AAR Comments at 7-9.

³⁰¹ Anterix Comments at 30; AAR Comments at 7-9.

³⁰² Letter from David L. Martin, Counsel to AAR, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200, at 1-2 (filed Oct. 2, 2019).

³⁰³ 900 MHz NPRM, 34 FCC Rcd at 1563, para. 36.

modification would not change the overall amount of 900 MHz spectrum in the Commission's inventory.³⁰⁴

104. Prior to the Commission issuing any order of modification, Anterix would, consistent with its commitment, voluntarily cancel the SMR licenses listed in Appendix E by filing FCC Form 601 in accordance with section 1.953(f)³⁰⁵ no later than 30 days following the adoption of this *Order of Proposed Modification*.³⁰⁶ For broadband license eligibility purposes, the Commission will credit Anterix towards its 50% demonstration in a county for any cancelled spectrum listed in Appendix E where the cancelled license covers all or part of the county.³⁰⁷ Moreover, we clarify that, where a cancelled license listed in Appendix E covers all or part of a county where Anterix is the broadband applicant, the Commission will deem Anterix's cancelled license to be spectrum relinquished towards the six megahertz total for purposes of calculating any applicable anti-windfall payment.³⁰⁸

105. Pursuant to our authority under section 316 of the Communications Act and section 1.87 of our rules, we propose to modify AAR's license by adding paired 125 kilohertz channels at 896-896.125/935-935.125 MHz to its existing six paired 900 MHz channels, with the condition that AAR transition off of, and file modification applications to delete its current six paired channels from its license no later than five years following issuance of any order of modification.³⁰⁹ This approach will ensure that AAR can continue its operations while facilitating a seamless transition towards the use of 250 kilohertz nationwide.

106. In accordance with section 316(a) of the Communications Act and section 1.87(a) of the Commission's rules, we will not issue a modification order until AAR has received notice of our proposed action and has an opportunity to protest.³¹⁰ Publication of this *Report and Order*, *Order of Proposed Modification*, and *Orders* in the Federal Register shall constitute notification in writing of our *Order of Proposed Modification* and of the grounds and reasons therefor. To protest the proposed modification, AAR, within thirty days of the date of such publication, must submit a written statement with sufficient evidence to show that the modification would not be in the public interest. AAR must file any protest in the Electronic Comment Filing System (ECFS) under WT Docket No. 17-200 or with the Office of the Secretary, Federal Communications Commission, 445 Twelfth Street, S.W., Room TW-A235, Washington, D.C. 20554.³¹¹ Both section 316 of the Communications Act and section 1.87 of our

³⁰⁴ No later than five years following the issuance of any order of modification, AAR would complete its transition to operation to wideband channel operation and would cancel the six paired 12.5 kilohertz narrowband channels on which it currently operates. Accordingly, within five years, Commission inventory will increase by 150 kilohertz in every market where AAR is licensed.

³⁰⁵ 47 CFR § 1.953(f).

³⁰⁶ Anterix may cancel its licenses on the condition that the channels are issued to AAR upon modification of AAR's license. See Letter from Elizabeth R. Sachs, Counsel to Anterix, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200, at 2 (filed Dec. 13, 2019). Also, we need not waive the 900 MHz freeze to accept Anterix's filing as it does not apply to license cancellations. See *900 MHz Freeze Public Notice*, 33 FCC Rcd at 8736.

³⁰⁷ See Letter from Elizabeth R. Sachs, Counsel to Anterix, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200, at 2 (filed Dec. 13, 2019); see also Appendix A, para. 13 (new section 27.1503(a)(1)).

³⁰⁸ See Appendix A, para. 13 (new section 27.1503(c)).

³⁰⁹ This timeframe aligns with AAR's representation to the Commission regarding transition of a nationwide rail network to wideband operations. See Letter from David L. Martin, Counsel to AAR, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200, at 2 (filed Dec. 13, 2019); see also Letter from Elizabeth R. Sachs, Counsel to Anterix, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200 (filed Dec. 13, 2019).

³¹⁰ See 47 U.S.C. § 316(a); 47 CFR § 1.87(a).

³¹¹ The license modification proceeding be treated as a permit-but-disclose proceeding under the Commission's *ex parte* rules. See, e.g., *Service Rules for Advanced Wireless Services in the 2000-2020 MHz and 2180-2200 MHz*

(continued....)

rules also authorize any other licensee or permittee that believes its license or permit would be modified by the proposed action to protest the proposed action.³¹² Any such protest must be filed with the Commission within thirty days of the publication of the *Report and Order, Order of Proposed Modification, and Orders* in the Federal Register.

107. We direct the Bureau to: (1) confirm the prior cancellation of SMR licenses in Appendix E, (2) adjudicate any petitions to deny the proposed license modification, and (3) issue any order of modification regarding AAR's 900 MHz nationwide ribbon license consistent with this proposed license modification, if in the public interest, consistent with the requirements of section 316 of the Communications Act and section 1.87 of our rules.³¹³

B. Obtaining a 900 MHz Broadband License in a County

1. License Application

108. We find it in the public interest to adopt the *NPRM*'s proposal to require an applicant for a new 900 MHz broadband license to demonstrate, as part of its application, that it satisfies the eligibility conditions (Eligibility Certification) and to submit a plan for transitioning the 900 MHz band in a particular county (Transition Plan).³¹⁴ As part of its overall application, we will use the information an applicant provides in its Eligibility Certification and Transition Plan to determine whether a grant of a 900 MHz broadband license is in the public interest. In the Eligibility Certification and Transition Plan, we require the applicant to submit all information necessary to determine the validity of the applicant's eligibility, including information necessary to assess its ability to acquire, relocate, or protect covered incumbents in the broadband segment. Although some commenters addressed 900 MHz broadband license eligibility criteria, we received no comments on the information that should be provided in 900 MHz broadband license applications. We adopt essentially the same elements of the Eligibility Certification and Transition Plan outlined in the *NPRM*, with adjustments to avoid adopting duplicative requirements.

109. *Eligibility Certification.* The Eligibility Certification, at a minimum, must list the licenses the applicant holds in the 900 MHz band to demonstrate that it holds more than 50% of the total licensed 900 MHz spectrum (whether SMR or B/ILT) for the relevant county, including credit for spectrum included in an application to acquire or relocate any covered incumbents filed on or after the *NPRM*'s release date, March 14, 2019; as well as a statement that the applicant's Transition Plan details its 900 MHz spectrum holdings in the broadband segment and how it has reached an agreement to clear through acquisition or relocation or how it will provide interference protection to, covered incumbent licensees collectively holding licenses in the broadband segment for at least 90% of the site-channels in the county and within 70 miles of the county boundary.³¹⁵

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Bands, Report and Order and Order of Proposed Modification, 27 FCC Rcd 16102, 16221-22, 16224, paras. 322, 334 (2012).

³¹² 47 U.S.C. § 316; 47 CFR § 1.87.

³¹³ Because we propose to modify AAR's license on our own motion, AAR is not required to file a modification application or accompanying waiver of the 900 MHz freeze. *See 900 MHz Freeze Public Notice*.

³¹⁴ *900 MHz NPRM*, 34 FCC Rcd at 1563, para. 35. An applicant must attach its Eligibility Certification and Transition Plan to its Form 601.

³¹⁵ *Id.* For eligibility purposes, an applicant must account for sites from complex systems (if any sites are located within the county and/or within 70 miles of the county boundary), either through an agreement to acquire, relocate, or protect those sites. Complex systems are a subset of covered incumbents and must be accounted for in the application materials.

110. *Transition Plan.* In the Transition Plan, the applicant must demonstrate one or more of the following for at least 90% of the site-channels in the county and within 70 miles of the applicable 900 MHz broadband license area, when including its license holdings in the county, as applicable: (1) agreement by covered incumbents to relocate from the broadband segment; (2) protection of site-based covered incumbents through compliance with minimum spacing criteria;³¹⁶ (3) protection of site-based covered incumbents through new or existing letters of concurrence agreeing to lesser base station separations;³¹⁷ (4) protection of geographically-based covered incumbents through private contractual agreements; and/or (5) evidence that it holds licenses for the site-channels. In particular, we require the Transition Plan to describe in detail all information and actions necessary to accomplish the realignment, as follows: (1) a description of the agreements reached with covered incumbents to relocate and the applications that the parties to the agreements will file for spectrum in the narrowband segment in order to relocate or repack licensees;³¹⁸ (2) a description of how the applicant will provide interference protection to, and/or acquire or relocate from the broadband segment, covered incumbents collectively holding licenses for at least 90% of site-channels in the county and within 70 miles of the county and/or evidence that it holds licenses for the site-channels; (3) any rule waivers or other actions necessary to implement an agreement with a covered incumbent;³¹⁹ and (4) such additional information as may be required.³²⁰

111. Further, we require that the applicant include in its Transition Plan a certification from an FCC-certified frequency coordinator that the Transition Plan's representations can be implemented consistent with Commission rules. Specifically, the frequency coordinator's certification must establish that the proposed relocations consider all relevant covered incumbents and are consistent with the existing part 90 interference protection criteria if the covered incumbent is site-based,³²¹ and include any private contractual agreements between the prospective broadband licensee and a geographically-licensed covered incumbent. Although commenters did not specifically address the role of frequency coordinators in the relocation process, we find that requiring a frequency coordinator to certify an applicant's Transition Plan serves the public interest by further ensuring that the licensee will be able to effectuate the proposed transition and deploy broadband, while adequately protecting covered incumbents. We anticipate no objection to a frequency coordinator certification requirement because frequency coordinators have for decades played a vital role in facilitating the narrowband 900 MHz licensing

³¹⁶ 47 CFR § 90.621(b)(4).

³¹⁷ 900 MHz NPRM, 34 FCC Rcd at 1562, para. 32; 47 CFR § 90.621(b)(5).

³¹⁸ The Transition Plan must describe in detail the specific frequencies that will be covered by applications filed by covered incumbents to relocate and the type of application that will be necessary (e.g., modification of license relocating to new frequencies).

³¹⁹ 900 MHz NPRM, 34 FCC Rcd at 1563, para. 35.

³²⁰ We will require the applicant to submit any other information needed for the Commission to determine whether the grant of an application is in the public interest. This is consistent with what we have required for short-form applications to participate in an auction. *See, e.g.*, 47 CFR § 1.21001(b)(9) (competitive bidding for Universal Service support).

³²¹ *See id.* § 90.621(b).

process.³²² In fact, we note that in October 2019, Anterix entered into a contract with Enterprise Wireless Alliance for frequency coordination services related to the proposed 900 MHz band realignment.³²³

112. Although no comments were received on the *NPRM*'s proposal that we allow an applicant seeking to transition multiple counties simultaneously to file a single Transition Plan that covers all of its county-based applications, we find that such a proposal furthers the public interest by increasing administrative efficiency and reducing the burden on an applicant. Accordingly, we adopt a rule allowing a single Transition Plan to cover multiple counties.

113. We direct the Wireless Telecommunications Bureau to issue a Public Notice as necessary describing in detail the information applicants must include in their Eligibility Certifications and Transition Plans and the procedures for submitting such materials. As stated above, the Transition Plan must include "such additional information as may be required," and the Public Notice will provide specificity on what additional information may be required. The Public Notice will also allow the Bureau to refine administrative details regarding Eligibility Certifications and Transition Plans, including the methodology for returning 900 MHz spectrum holdings to the Commission and the format in which to provide required information to the Commission.

2. Implementation Procedures

114. Consistent with the *NPRM*'s proposal, the negotiation-based transition will commence upon issuance of a Public Notice opening a filing window during which the Wireless Telecommunications Bureau will accept applications consistent with the adopted rules.³²⁴ Although the majority of commenters addressing the issue supported a two-year window,³²⁵ we find, after reviewing the record, that adopting a finite period for filing applications is unnecessary at this time. We find that not setting a closing date for the negotiation-based transition permits market forces to determine the appropriate timing of any transition in a county and encourages thorough consideration of the business and engineering concerns of relocation. Following our 2021 evaluation of the success of the 900 MHz band realignment, including an assessment of whether alternative steps might be necessary to effectuate a more complete transition, we may close the filing window if we find it to be in the public interest.

115. Consistent with the Commission's part 1 rules and the *NPRM*'s proposal, applications for 900 MHz broadband licenses will be accepted for filing and placed on Public Notice for 30 days, during

³²² See, e.g., Petition of Enterprise Wireless Alliance and Pacific Data Vision for Rulemaking, RM-11738, at 18 (filed Dec. 8, 2014), <https://ecfsapi.fcc.gov/file/60001008215.pdf> (discussing EWA's "deep experience in 900 MHz frequency coordination and operations"); Anterix/EWA NOI Further Comments at 20-21 (discussing "the well-established Part 90 frequency coordination" when suggesting the Commission propose rules to reconfigure the 900 MHz band).

³²³ Enterprise Wireless Alliance, *Enterprise Wireless Insider*, Volume 13, Issue 16 (Nov. 1, 2016), <https://www.enterprisewireless.org/media/insider/enterprise-wireless-insider-volume-13-issue-16>.

³²⁴ 900 MHz *NPRM*, 34 FCC Rcd at 1564, para. 39. Because certain rules are subject to the Paperwork Reduction Act, the effective date will be announced by the Commission in the Federal Register following Office of Management and Budget approval to collect information related to the new 900 MHz application rules.

³²⁵ Southern California Edison Comments at 11, 14; Utilities Technology Council at 22 ("at least two years"); Anterix Reply at 13. UPS suggested a one year period in its Comments and 30 months in its Reply Comments. Another commenter suggested a 3-5 year period. American Petroleum Institute and the Energy Telecommunications and Electrical Association Comments at 5. Many commenters supporting a fixed window argue that it will encourage efficient transition of the 900 MHz band. See, e.g., American Petroleum Institute and the Energy Telecommunications and Electrical Association Comments at 5; Southern California Edison Comments at 11, 14; UPS Comments at 14; Utilities Technology Council at 22; Anterix Reply at 13.

which time interested parties may file petitions to deny.³²⁶ The broadband license applicant will be required to file, within 15 days of filing its broadband license application, an application(s) to cancel all of its 900 MHz SMR and B/ILT spectrum, up to six megahertz, conditioned upon Commission grant of its application. After review of the required filings, the Commission, if it finds that the applicant has satisfied the eligibility restrictions, application requirements, and anti-windfall provisions, and that grant of the application is otherwise in the public interest, will grant the application and issue a 3/3 megahertz broadband license for the requested county. In the Public Notice granting the 900 MHz broadband license authorization, the Commission will list the call signs of the covered incumbents subject to mandatory relocation, if relevant.

116. NextEra Energy suggests that the Commission adopt procedures by which qualified licensees can claim a complex system exemption,³²⁷ including a method for filing for an exemption, Commission processing of and ruling on exemption requests, and a partial lifting of the 900 MHz freeze.³²⁸ We find it in the public interest to adopt certain concepts that NextEra supports, such as determining complex system status on a one-time snapshot basis and allowing complex systems to continue operating within their exempt contour.³²⁹ We decline, however, to adopt the procedures NextEra suggests related to the complex system exemption and the associated partial lifting of the 900 MHz freeze, which we find overly complicated and potentially administratively burdensome. Further, licensees can use ULS to identify the entities holding geographic area SMR licenses and review the number of fixed 900 MHz sites in determining complex system exemption status, and can review applicable Public Notices regarding 900 MHz broadband applications to assess whether an applicant has properly accounted for complex systems related to a county under transition.

117. As we outlined in the *NPRM*, after grant of a license, a new 900 MHz broadband licensee can begin operation in the applicable county, subject to protecting covered incumbents holding existing narrowband licenses in the broadband segment within the county and within 70 miles of the county boundary.³³⁰ Grant of a license also triggers the new 900 MHz broadband licensee's ability to compel mandatory relocation from the broadband segment all covered incumbents' remaining site-channels in a given county and within 70 miles of the county boundary, except complex systems. We also clarify that the timeline for complying with the performance requirements commences upon the Commission's grant of the license.³³¹

C. Licensing and Operating Rules

118. Today, we facilitate the potential for 900 MHz broadband licensing on a county-by-county basis, while establishing rules to ensure intensive spectrum use. We adopt licensing and operating rules for new 900 MHz broadband operations under part 27 of our rules. We adopt service-specific rules for the 900 MHz broadband segment, including license term and performance requirements. We also describe below the licensing and operating rights of 900 MHz narrowband licensees.

1. Broadband Segment

a. Allocation of 900 MHz band

³²⁶ See 47 U.S.C. § 309; 47 CFR §§ 1.933(b), 1.939; *900 MHz NPRM*, 34 FCC Rcd at 1565, para. 40. We note that no commenters addressed the application and applicable review procedures.

³²⁷ *NextEra Complex System Procedure Ex Parte*.

³²⁸ *Id.* at 3-5.

³²⁹ *Id.* at 1, 4.

³³⁰ *900 MHz NPRM*, 34 FCC Rcd at 1562, para. 33.

³³¹ See *id.* at 1571, para. 60.

119. We adopt an allocation for the 900 MHz broadband segment consistent with the *NPRM*'s proposal³³² that provides flexibility for the deployment of broadband services in the 900 MHz band. We believe that the new broadband segment in the 900 MHz band has the potential to provide a valuable service to address a shortage in broadband capacity for a wide range of users, including business, enterprise, and government consumers. Accordingly, we are replacing the Land Mobile Service allocation in the 900 MHz band with a Mobile Except Aeronautical Mobile Service allocation on a co-primary basis with the Fixed Service.³³³ The new allocation is consistent with the allocations in the 890-902 MHz and 928-942 MHz bands in Region 2 of the International Table of Frequency Allocations.³³⁴ It will allow narrowband operations in both transitioned and non-transitioned markets because Mobile encapsulates Maritime Mobile, Aeronautical Mobile, and Land Mobile.³³⁵ Therefore, by allocating the 3/3 megahertz portion of the 900 MHz band for Mobile Except Aeronautical Mobile, we continue to allow Land Mobile Service operations in the broadband segment, provided the narrowband operations are protected according to our rules.

120. We find that these changes to the Table of Allocations are consistent with the Commission's authority under section 303(y) of the Communications Act.³³⁶ First, as required by section 303(y)(1), flexible use of the 900 MHz band is consistent with applicable international agreements. Such use would remain subject to bilateral discussions commonly undertaken whenever spectrum is put to use in border areas. Second, as required by section 303(y)(2), after notice and comment, we find that flexible use: (1) is in the public interest, (2) will stimulate investment in broadband, and (3) would not result in harmful interference.³³⁷ Replacing the Land Mobile Service allocation with a Mobile Except Aeronautical Mobile Service allocation in the broadband segment will promote innovation and investment in new wireless technologies, while preserving incumbent narrowband uses.

b. Part 27 Miscellaneous Wireless Communications Service

121. As proposed in the *NPRM*, we designate the 900 MHz broadband allocation as a Miscellaneous Wireless Communications Service governed by part 27 of the Commission's rules.³³⁸ Like other services authorized under part 27, a 900 MHz broadband license applicant must designate its regulatory status.³³⁹ We also adopt service-specific rules in part 27 for the 900 MHz broadband segment.

³³² *Id.* at 1555, para. 13.

³³³ 47 CFR § 2.106.

³³⁴ *Id.* § 2.106. In Region 2 of the International Table of Frequency Allocations, the 890-902 MHz and 928-942 MHz bands are allocated to the Fixed Service and Mobile Except Aeronautical Mobile Service on a co-primary basis and the Radiolocation Service on a secondary basis. *Id.* The International Table of Frequency Allocations, included in the Commission's rules for informational purposes only, is subdivided into the Region 1 Table, Region 2 Table, and the Region 3 Table. The U.S. Table is based on the Region 2 Table because the relevant area of jurisdiction is located primarily in Region 2 (i.e., the 50 States, the District of Columbia, the Caribbean insular areas, and some of the Pacific insular areas). *Id.* §§ 2.104, 2.105.

³³⁵ See International Telecommunications Union, *Recommendation SM.1133: Spectrum Utilization of Broadly Defined Services (Question ITU-R 205/1)* (1995), at 2, https://www.itu.int/dms_pubrec/itu-r/rec/sm/R-REC-SM.1133-0-199510-I!!PDF-E.pdf.

³³⁶ 47 U.S.C. § 303(y); see *900 MHz NPRM*, 34 FCC Rcd at 1555, para. 14.

³³⁷ 47 U.S.C. § 303(y).

³³⁸ *900 MHz NPRM*, 34 FCC Rcd at 1569, para. 56. A 900 MHz broadband licensee must comply with all the licensing and operating rules applicable to part 27 services including, for example, renewal criteria (rule 1.949); permanent discontinuance of operations (rule 1.953); partitioning and disaggregation (rule 1.950); and spectrum leasing (rule 1.9001 *et seq.*).

³³⁹ An applicant shall specify in its initial application if it is requesting authorization to provide common carrier, non-common carrier, private internal communications, or broadcast services, or a combination thereof. See 47 CFR

(continued....)

We decline to regulate a 900 MHz broadband license under part 90 of our rules, which will continue to govern narrowband licensee operations either in the newly designated narrowband segments, or in the broadband segment as a non-relocated covered incumbent subject to interference protection. Various commenters support the designation of the 900 MHz broadband segment as a part 27 Miscellaneous Wireless Communications Service, and none oppose the designation.³⁴⁰

c. Geographic Area Licensing by County

122. We find it in the public interest to license the 900 MHz broadband segment on a geographic area basis because it promotes spectrum efficiency, expedites deployment of flexible-use services, and provides licensees with flexibility to quickly adjust and coordinate spectrum usage. We conclude that counties represent an appropriate geographic area for 900 MHz broadband licenses,³⁴¹ as they should foster flexible and innovative use of the 900 MHz band and provide a consistent, relatively small license size appropriate for a wide range of possible network deployments.³⁴² Commenters support adoption of county license areas.³⁴³ We find that adopting a county license area, rather than a smaller geographic area (e.g., census tract), will stimulate investment, promote innovation, and encourage the efficient use of spectrum.

123. We decline to adopt geographic license areas larger than counties because doing so could potentially hinder successful negotiations between prospective 900 MHz broadband licensees and an increased number of incumbents or limit the ability of electric utilities or other similar stakeholders to acquire or successfully build out 900 MHz broadband licenses.³⁴⁴

d. License Term

124. As proposed in the *NPRM*, we adopt an initial license term of 15 years for 900 MHz broadband licenses.³⁴⁵ We adopt a term of 10 years for any subsequent license renewals. The Commission typically has adopted 10-year license terms for part 27 services,³⁴⁶ but in certain cases it also

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§ 27.10(b). This is consistent with the change adopted herein to § 27.5, to which § 27.10(b) refers.

³⁴⁰ Anterix Comments at 33; Utilities Technology Council Comments at 23. Commenters suggested that part 27 would be better aligned with broadband service than part 90, which generally governs site-based licenses.

³⁴¹ *900 MHz NPRM*, 34 FCC Rcd at 1558, para. 22. For purposes of the 900 MHz broadband licenses, we define counties using the United States Census Bureau's data reflecting county legal boundaries and names valid through January 1, 2017. To determine the counties, we downloaded a shapefile from the Census Bureau entitled County and Equivalent Entity National Shapefile (Current) Counties. Equivalent entities are primary legal divisions of states. In most states, these entities are termed "counties." For a list of the 2017 counties and county equivalents, please visit Federal Communications Commission, *FCC Areas* (updated June 30, 2016), <https://www.fcc.gov/oet/maps/areas>.

³⁴² *900 MHz NPRM*, 34 FCC Rcd at 1558, para. 22.

³⁴³ Anterix Comments at 9; Duke Energy Comments at 13; Southern California Edison Comments at 11; Motorola Comments at 3; UPS Comments at 4; Lower Colorado River Authority Comments at 24; Utilities Technology Council Comments at 14; Utilities Technology Council Reply at 2; UPS Reply at 2. Some commenters supported county-based license areas because county-based license areas would better align with the needs of utilities. See Southern California Edison Comments at 11; Lower Colorado River Authority Comments at 24; Utilities Technology Council Comments at 14.

³⁴⁴ *900 MHz NPRM*, 34 FCC Rcd at 1559, para. 23. See also Lower Colorado River Authority Comments at 25; Utilities Technology Council Comments at 15.

³⁴⁵ *Id.* at 1570-71, para. 59.

³⁴⁶ See 47 CFR § 27.13.

has found a longer initial term to be in the public interest.³⁴⁷ Given the complexities and timing of transitioning certain operations in this band, we find that an initial license term longer than 10 years is warranted to encourage the investment necessary to develop the band.³⁴⁸ We find that a 15-year license term is appropriate for 900 MHz broadband licensees, and we agree with commenters suggesting a license term longer than 10 years aligns with the long-term spectrum needs and business cycles typical for utilities and industrial entities, the likely users of 900 MHz broadband spectrum.³⁴⁹ Commenters generally support a 15-year license term.³⁵⁰

125. Although some commenters suggest that the Commission should adopt a 20-year license term,³⁵¹ we believe a 15-year term strikes the appropriate balance to encourage timely completion of a negotiation-based transition and the provision of wide variety of broadband uses, while at the same time providing sufficient time to recoup the initial costs of investment.

e. Performance requirements

126. As proposed in the *NPRM*, and consistent with the Commission's approach in implementing its spectrum management obligations, we find it in the public interest to adopt performance requirements for geographic-area 900 MHz broadband licenses.³⁵² Performance requirements promote the productive use of spectrum, encourage licensees to provide service in a timely manner, and promote the provision of innovative services and technologies in unserved areas, particularly rural markets.³⁵³ In the *NPRM*, we proposed that a licensee must deploy broadband technologies and offer broadband services to meet performance benchmarks.³⁵⁴ We proposed performance benchmarks based on population coverage and sought comment on any potential alternative metrics.³⁵⁵

127. The record supports the adoption of performance requirements,³⁵⁶ with commenters

³⁴⁷ See, e.g., *Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands*, WT Docket No. 02-353, Report and Order, 18 FCC Rcd 25162, 25190, para. 70 (2003) (transition warranted a 15-year initial license term, with 10-year terms thereafter); *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268, Report and Order, 29 FCC Rcd 6567, 6875, para. 759 (2014) (transition warranted a 12-year initial license term, with 10-year terms thereafter); see also *Allocation and Service Rules for the 1675-1680 MHz Band*, WT Docket No. 19-116, Notice of Proposed Rulemaking, 34 FCC Rcd 3552, 3565, para. 32 (2019) (proposing 15-year initial and renewal license terms for licenses in the 1675-1680 MHz band because it would afford licensees sufficient time to make long-term investments in deployment).

³⁴⁸ Anterix Reply at 15; Utilities Technology Council Comments at 25.

³⁴⁹ Anterix Comments at 15; Duke Energy Comments at 16.

³⁵⁰ Anterix Comments at 34; Ericsson Comments at 4; Utilities Technology Council at 25; Burns & McDonnell Comments at 3. We received no comments on the proposed subsequent renewal terms.

³⁵¹ Southern Company Comments at 2, 8; Duke Energy Comments at 16; Anterix Reply at 15; Burns & McDonnell Comments at 3.

³⁵² *900 MHz NPRM*, 34 FCC Rcd at 1571, para. 60.

³⁵³ See *Promoting Investment in the 3550-3700 MHz Band*, GN Docket No. 17-258, Report and Order, 33 FCC Rcd 10598, 10631, para. 61 (2018); *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services et al.*, GN Docket No. 14-177, Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 8014, 8084, para. 191 (2016). See also 47 U.S.C. § 309(j)(4)(B).

³⁵⁴ *900 MHz NPRM*, 34 FCC Rcd at 1572, para. 62.

³⁵⁵ *Id.* at 1571, paras. 60-61.

³⁵⁶ Anterix Comments at 35-36; Southern Company Comments at 2, 9, 11; Southern California Edison Comments at 17; Utilities Technology Council Comments at 24-26; Duke Energy Comments at 9, 17; Burns & McDonnell Comments at 3; Ericsson Comments at 5; Southern Company Reply at 5-6; UPS Reply at 9-10; Utilities Technology

(continued....)

generally favored tailored performance requirements, including a geographic coverage option related to the spectrum user's infrastructure and served customers,³⁵⁷ because such metrics would better accommodate the utilities, private wireless carriers, and other likely users of the band.³⁵⁸ Some commenters argue that performance requirements using population metrics are inappropriate for the 900 MHz broadband segment because the likely users of the spectrum will be utilities and similar entities deploying private wireless networks that may be located away from densely populated areas.³⁵⁹ One commenter proposed that we adopt a requirement to cover geography in and around part 90 users' infrastructure, with 30% of customers served in six years and 60% within twelve years.³⁶⁰

128. We find it in the public interest to adopt a two-fold tailored performance requirement whereby a 900 MHz broadband licensee must: (1) provide reliable signal coverage and offer broadband service; and (2) meet either (a) a population coverage requirement, or (b) a geographic coverage requirement. We adopt as proposed a population coverage metric whereby a 900 MHz broadband licensee can meet the performance requirements by providing a reliable signal coverage and offering broadband service to a percentage of the population in the county.³⁶¹ We also find it necessary to provide 900 MHz broadband licensees with the option of providing reliable signal coverage and offering broadband service in a geographic percentage of the county-based license area. Commenters agree that we should adopt an alternative to population coverage.³⁶² This geographic coverage option will facilitate significant deployment for those serving industries in less populated areas.

129. *Population Metric.* One way for a 900 MHz broadband licensee to satisfy its performance requirement would be to meet the population benchmarks. Under this approach, as an interim performance benchmark, a 900 MHz broadband licensee would be required to provide reliable signal coverage and offer broadband service to at least 45% of the population in its license area within six years of license grant.³⁶³ As the final benchmark, a 900 MHz broadband licensee choosing this option would have to provide reliable signal coverage and offer broadband service to at least 80% of the

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Council Comments at 20-21; Anterix Reply at 16. No commenter opposed the adoption of a performance requirement.

³⁵⁷ Anterix Comments at 35; Southern Company Comments at 2; Utilities Technology Council Comments at 24-25; Duke Energy Comments at 9; Southern Company Reply at 6; Burns & McDonnell Comments at 3.

³⁵⁸ Anterix Comments at 35; Southern Company Comments at 2, 9.

³⁵⁹ Anterix Comments at 35; Southern Company Comments at 26; Utilities Technology Council Comments at 26; Southern California Edison Comments at 17; Utilities Technology Council Reply at 20; Duke Energy Comments at 9; Burns & McDonnell Comments at 3; UPS Comments at 9; Southern Company Reply at 5.

³⁶⁰ Duke Energy Comments at 17.

³⁶¹ 900 MHz NPRM, 34 FCC Rcd at 1571, para. 60.

³⁶² See, e.g., Anterix Comments at 35; Utilities Technology Council Comments at 24, 25; Utilities Technology Council Reply at 21.

³⁶³ 900 MHz NPRM, 34 FCC Rcd at 1571, para. 60. These requirements are largely consistent with recent performance benchmarks in services where broadband is expected. See, e.g., *Allocation and Service Rules for the 1675-1680 MHz Band*, WT Docket No. 19-116, Notice of Proposed Rulemaking, 34 FCC Rcd 3552, 3565, para. 34 (2019); *Amendment of the commission's Rules with Regard to Commercial Operations in the 1695-1710 MHz, 1755-1780 MHz and 2155-2180 MHz Bands*, GN Docket No. 13-185, Report and Order, 29 FCC Rcd 4610, 4659, para. 135 (2014); *Service Rules for Advanced Wireless Services in the 2000-2020 MHz and 2180-2200 MHz Bands, et al.*, WT Docket No. 12-70, Report and Order and Order of Proposed Modification, 27 FCC Rcd 16102, 16111, para. 20 (2012).

population in its license area within twelve years of license grant.³⁶⁴

130. *Geographic Coverage.* Alternatively, a 900 MHz broadband licensee may demonstrate at the interim benchmark that it provides reliable signal coverage and offers broadband service covering at least 25% of the geographic license area within six years of license grant.³⁶⁵ A 900 MHz broadband licensee may demonstrate at the final benchmark that it provides reliable signal coverage and offers broadband service covering at least 50% of the geographic license area within twelve years of license grant. Some commenters suggest the 900 MHz broadband performance requirements should include a geographic component.³⁶⁶ We recognize that utilities, industrial entities, and/or other private wireless users are the most likely users of the 900 MHz broadband segment, and we agree that some of these operations occur outside of populated areas.³⁶⁷ We believe that adopting alternative geographic metrics of 25% and 50% of the county will spur investment and will better meet the operational needs of likely users while encouraging 900 MHz broadband deployment in less populated areas.

131. We received support and no opposition in the record for setting six- and 12-year quantifiable benchmarks.³⁶⁸ We find that setting benchmarks serves the public interest because it facilitates significant deployment through either population-based measurements or geographic-based metrics and can result in service to important industries in less populated areas. Twelve years from the date of issuance provides sufficient time for any 900 MHz broadband licensee to provide broadband service and meet either the population or geographic coverage requirement.³⁶⁹ These benchmarks are both temporally and quantitatively reasonable, allow a licensee to meet the requirements in two different ways, and enable the Commission to take corrective action should the required deployment fail to occur. After satisfying the 12-year, final performance benchmark, a licensee must continue to provide coverage and offer broadband service at or above that level for the remaining three years of the 15-year license term in order to warrant license renewal.³⁷⁰ We received no comments opposing the procedural aspects of the performance requirements.³⁷¹

132. *Broadband Requirement.* We adopt performance requirements consistent with flexible use, geographic area licenses.³⁷² Given the core rationale for realigning the 900 MHz band, we also find it in the public interest to require the offering of broadband services as a component of meeting the performance requirements, whether through population or geographic coverage. For purposes of a 900

³⁶⁴ 900 MHz NPRM, 34 FCC Rcd at 1571, para. 60. Ericsson Comments at 5; Southern California Edison Comments at 17.

³⁶⁵ See, e.g., Anterix Comments at 35; Southern Company Comments at 2; Utilities Technology Council Comments at 24-25; Duke Energy Comments at 9; Southern Company Reply Comments at 6; Burns & McDonnell Comments at 3.

³⁶⁶ Utilities Technology Council Comments at 21, 24-25.

³⁶⁷ See Anterix Comments at 35; Southern Company Comments at 2, 9; Utilities Technology Council Comments at 24-25; Duke Energy Comments at 9, 17; Southern Company Reply at 6.

³⁶⁸ Ericsson Comments at 5; Southern California Edison Comments at 17.

³⁶⁹ 900 MHz NPRM, 34 FCC Rcd at 1571, para. 60.

³⁷⁰ *Id.*

³⁷¹ Although commenters may have had varying views on the parameters of the performance requirements, those commenting on the performance requirement timeframes suggested six and 12 year benchmarks were appropriate. See Southern California Edison Comments at 17; Duke Energy Comments at 17; Southern Company Comments at 6; Ericsson Comments at 5.

³⁷² See e.g., 47 CFR §§ 30.104, 96.25(b)(4) (basing performance requirements for county-based 28 GHz licenses and county-based 3.5 GHz licenses on population coverage).

MHz broadband license, we expect that technologies deployed to offer broadband services would make intensive use of the entire 3/3 megahertz band segment and yield high uplink and downlink data rates and minimal latency sufficient to provide for real-time, two-way communications. To provide flexibility and given the likelihood that standards may evolve over the license term, we decline to mandate specific data rates or latency metrics. Rather, we adopt a safe harbor below for satisfying the requirement to provide broadband service in the 900 MHz broadband segment.

133. Some commenters suggest that we should allow licensees to meet the performance requirements through narrowband Internet of Things (NB-IoT),³⁷³ and many advocate for permitting broadband systems using a 1.4/1.4 megahertz configuration.³⁷⁴ We allow for flexible use in the band, and therefore do not prohibit the use of 1.4/1.4 megahertz channels or the provision of narrowband-Internet of Things (NB-IoT) services in the broadband segment. We find, however, that a cornerstone rationale for reconfiguring the 900 MHz band is to enable broadband technologies and services in a 3/3 megahertz paired channel, and 1.4/1.4 megahertz channels and narrowband applications such as NB-IoT clearly would not reflect the intensive use of the entire band. Accordingly, a 900 MHz broadband licensee will not be permitted to rely solely on such operations (e.g. 1.4/1.4 megahertz channels or NB-IoT) in demonstrating compliance with our performance requirements, as coverage of either population or geography must be met with a reliable signal and offering of service through a 3/3 megahertz paired channel. We clarify, however, that provision of services over 1.4/1.4 megahertz channels or NB-IoT services could potentially be provided as an ancillary service offering to a 3/3 megahertz broadband service or offered in service areas outside those relied upon to satisfy the population or geographic area coverage benchmarks.

134. *Safe Harbor for Provision of Broadband.* As proposed in the *NPRM*, we require 900 MHz broadband licensees to deploy broadband technologies and offer broadband services.³⁷⁵ We provide a safe harbor, which a 900 MHz broadband licensee may rely upon to comply with the requirement that it offer broadband services in conjunction with meeting either the population-based or geographic-based performance benchmarks. Specifically, we find that a 900 MHz broadband licensee is offering broadband if the service has the following minimum features: provide 3/3 megahertz 3GPP standard LTE service offering for advanced services.³⁷⁶ With the safe harbor, we do not intend to thwart technological improvements and 900 MHz broadband licensees are free to submit for Commission review an alternative methodology for a 900 MHz broadband licensee to meet the broadband service component of the performance requirement. As suggested in the *NPRM*, a benefit of a 3/3 megahertz broadband segment is the ability to support LTE service.³⁷⁷ Commenters support this idea,³⁷⁸ and we agree that LTE networks

³⁷³ Duke Energy Comments at 18; Utilities Technology Council Comments at 26; Burns & McDonnell Comments at 3; Utilities Technology Council Reply at 20-21.

³⁷⁴ See, e.g., Southern California Edison Comments at 6; Utilities Technology Council Reply at 5; City of Los Angeles Department of Water and Power Comments at 4; NextEra Energy, Inc. Comments at 18.

³⁷⁵ 900 MHz *NPRM*, 34 FCC Rcd at 1572, para. 62.

³⁷⁶ By LTE, we refer to the global standard for wireless communications of high-speed data for mobile phones and data terminals, developed by 3GPP. See LTE, 3GPP, <https://www.3gpp.org/technologies/keywords-acronyms/98-lte> (last visited Jan. 8, 2020). The LTE standard supports operation in the following channel bandwidth in Frequency-Division Duplexing (FDD) mode: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz and 20 MHz. See 3rd Generation Partnership Project, LTE; "Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception (release 15)," 3GPP TS 36.104 version 15.3.0 at Section 5.6 (2018).

³⁷⁷ 900 MHz *NPRM*, 34 FCC Rcd at 1554, para. 11.

³⁷⁸ Ericsson Comments at 2-3; Mission Critical Partners, Inc. Comments at 1-2; Multi-Tech Systems, Inc. Comments at 1; Anterix Reply at 1-3.

will benefit the likely customer base of utilities and other part 90 users.³⁷⁹ LTE service will help open the 900 MHz band for additional uses that will facilitate efficiency and encourage innovation for mission-critical communications. We find that a 3/3 megahertz channel offers more resources for data, which increases overall spectral efficiency, and which the record supports.³⁸⁰

135. A 900 MHz broadband licensee relying on the safe harbor must base its LTE network on the 3GPP standard release 8 or a later release.³⁸¹ Southern California Edison argues that adoption of the 3GPP standard in the 900 MHz broadband segment would delay deployment or drive up costs due to a deviation in 3GPP standards regarding LTE spacing.³⁸² We disagree and find the 3GPP standard release 8 or a later release is appropriate for the 900 MHz broadband segment safe harbor because it aligns with international standards and encourages interoperability between utilities and other services such as public safety entities. We anticipate that equipment manufacturers will adjust base station equipment and user equipment to accommodate any changes in release 8 for North America. Further, several LTE bands have duplex spacing of less than 45 megahertz, so we do not anticipate that 39 megahertz spacing will be an issue.³⁸³ We agree with a commenter that described the deviations as minor and having little to no impact.³⁸⁴

136. Additionally, a 900 MHz broadband licensee relying on the safe harbor must provide advanced services over its 3GPP-based 3/3 megahertz LTE service. We find that a 900 MHz broadband licensee is suited to use dedicated capacity necessary for serving data-intensive applications of its customers.³⁸⁵ For example, a 900 MHz broadband licensee should demonstrate that it is providing service with low latency, high reliability, and increased security.³⁸⁶ Moreover, the broadband licensee should demonstrate it is offering certain next generation services for its customers, such as, but not limited to, surveillance, advanced metering, mission-critical applications, one-to-many push-to-talk, 4x2 multiple-input multiple-output, and evolved Multimedia Broadcast Multicast Services.³⁸⁷

137. *Penalties.* As proposed, we adopt penalties for failure to meet performance requirements.³⁸⁸ If a 900 MHz broadband licensee fails to meet the first performance benchmark, we require the licensee to meet the final performance benchmark two years sooner (i.e., at 10 years into the license term) and we reduce the license term from 15 years to 13 years.³⁸⁹ If a 900 MHz broadband licensee fails to meet the final performance benchmark, its authorization for that license area will

³⁷⁹ Ericsson Comments at 2-3; Mission Critical Partners, Inc. Comments at 1.

³⁸⁰ See, e.g., Southern Company Reply at 9.

³⁸¹ See Release 8, 3GPP, <https://www.3gpp.org/specifications/releases/72-release-8> (last visited Jan. 8, 2020).

³⁸² Southern California Edison Reply at 9.

³⁸³ For example, LTE Bands 12, 14, and 17 (700 MHz) have duplex spacing of 30 megahertz, and LTE Band 13 duplex spacing is 31 megahertz.

³⁸⁴ FirstEnergy Comments at 7.

³⁸⁵ See, e.g., Southern Company Comments at 5, 9; General Electric Renewables Reply at 1 (“supports FCC’s proposal to create a 900 MHz PEBB segment . . . in a band with highly favorable propagation and penetration characteristics”).

³⁸⁶ See, e.g., Enterprise Wireless Alliance Comments at 2; NextEra Energy, Inc. Comments at 8; Southern Company Comments at 5.

³⁸⁷ See, e.g., Southern Company Comments at 5; National Rural Electric Cooperative Association Reply at 2.

³⁸⁸ 900 MHz NPRM, 34 FCC Rcd at 1572, para. 64.

³⁸⁹ *Id.*

terminate automatically without Commission action.³⁹⁰

138. The Commission has adopted similar penalties for failure to meet performance benchmarks in other geographically licensed wireless services³⁹¹ and we expect that 900 MHz broadband licensees will deploy at or in excess of the buildout metrics. If a license terminates, the spectrum would become available for assignment subject to the eligibility requirements adopted herein, or any subsequent license issuance or competitive bidding rules that we may adopt for this service after we evaluate the success of the transition to broadband. We also remind 900 MHz broadband licensees that if they rely on a lessee to meet the performance requirements adopted herein, and the lessee fails to do so, we will enforce the performance requirements failure on the licensee.³⁹² No commenters addressed the appropriate penalties for the failure to meet performance requirements.

f. Renewal Term Construction Obligations

139. In the *NPRM*, we sought comment on whether to apply specific renewal term construction obligations to 900 MHz broadband licenses.³⁹³ Commenters specifically opposed renewal term construction obligations, arguing that the likely users of broadband service consisting of utilities, industrial entities, and private users, do not need an incentive to support additional spectrum usage.³⁹⁴ We decline to adopt at this time specific renewal term construction obligations for 900 MHz broadband licenses in addition to, and independent of, the renewal requirements in section 1.949 of our rules.³⁹⁵

140. We note that the issue of potentially extending construction obligations beyond the initial license term is currently under consideration in the Commission's Wireless Radio Service proceeding,³⁹⁶ and that the 900 MHz broadband service is designated as a Wireless Radio Service and would be subject to any future action in the WRS proceeding.

g. Mobile Spectrum Holdings Policies

141. As we proposed in the *NPRM*, we decline to include the 900 MHz broadband segment in the Commission's spectrum aggregation screen.³⁹⁷ Only one commenter responded to our request for comment on mobile spectrum holdings issues involving the 900 MHz broadband spectrum, and that entity supports our inclination to exclude the 900 MHz broadband segment from the spectrum screen.³⁹⁸ No commenters objected to our proposal. Accordingly, we adopt our proposal to exclude the 900 MHz broadband segment from the spectrum screen at this time.

2. Narrowband Segments

142. The new 896-897.5/935-936.5 MHz and 900.5-901/939.5-940 MHz narrowband segments consist of 158 narrowband paired channels (12.5 kilohertz frequency pairs) grouped into two

³⁹⁰ *Id.*

³⁹¹ *See, e.g.*, 47 CFR § 27.14.

³⁹² *See id.* § 1.9030(d)(5)(ii).

³⁹³ *900 MHz NPRM*, 34 FCC Rcd at 1574-75, para. 68-69.

³⁹⁴ Southern Company Comments at 11; Southern California Edison Comments at 18.

³⁹⁵ *900 MHz NPRM*, 34 FCC Rcd at 1574, para. 68; Anterix Comments at 36.

³⁹⁶ *See Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95, and 101 To Establish Uniform License Renewal et al.*, WT Docket No. 10-112, Second Report and Order and Further Notice of Proposed Rulemaking, 32 FCC Rcd 8874, 8911-18, paras. 100-23 (2017) (*WRS Renewal 2nd R&O and FNPRM*).

³⁹⁷ *900 MHz NPRM*, 34 FCC Rcd at 1570, para. 58.

³⁹⁸ Anterix Comments at 34.

blocks separated by the 3/3 megahertz broadband segment. As proposed in the *NPRM*, we find it in the public interest to no longer distinguish between B/ILT and SMR blocks in the new narrowband segments in transitioned markets.³⁹⁹ We limit access to new channels in the narrowband segment in transitioned markets to those eligible for B/ILT Pool frequencies, with limited exceptions. This approach serves the public interest by helping ensure sufficient spectrum is available for these entities to not only relocate, but to meet ongoing operational needs. We recognize, however, that B/ILT, site-based SMR and geographically-based SMR entities are currently licensed in the narrowband segments in what may become a transitioned market. We clarify that, although we eliminate the B/ILT and SMR spectrum block distinction in such markets, these licensees may continue to operate on existing channels.⁴⁰⁰ In addition, we will permit access to narrowband segment spectrum in transitioned markets for covered incumbent operations if relocated from the broadband segment (whether B/ILT, site-based SMR or geographically-licensed SMR). We further clarify that current part 90 rules generally apply to the following entities: B/ILT Pool eligibles seeking access to new channels when available; existing B/ILT Pool and SMR licensees operating on channels in the new narrowband segment; B/ILT Pool and SMR licensees relocated to the new narrowband segment from the broadband segment; and those non-relocated B/ILT Pool and SMR licensees continuing to operate on a protected basis in the broadband segment.⁴⁰¹ We amend our Part 90 rules, however, to specify, in transitioned markets: the limitations on eligibility for access to new narrowband segment channels, the narrowband segment channels available for licensing, and the elimination of the current distinction between the B/ILT and SMR pools.

143. Commenters argue that access to the narrowband licenses should be limited to B/ILT Pool eligible entities,⁴⁰² as many entities rely on the narrowband B/ILT Pool allocation for mission-critical applications.⁴⁰³ Utilities Technology Council suggests the Commission “should establish eligibility restrictions in general to conserve the availability of spectrum”⁴⁰⁴ and limiting eligibility for B/ILT Pool entities in the narrowband segments would “ensure the safe, reliable and secure delivery of essential electric, gas and water services as well as other critical transport and petroleum services”⁴⁰⁵ We agree with commenters that limiting eligibility for access to new narrowband segment spectrum may

³⁹⁹ 900 MHz *NPRM*, 34 FCC Rcd at 1577, para. 76.

⁴⁰⁰ In addition to primary site-based operations, there are other categories of secondary operations, including: mobile (all), mobile (no fixed), itinerant, temporary fixed, and 6.1m Control assignments. See 47 CFR §§ 90.137, 90.138, 90.175(j)(5), 90.249(a)(2), 90.637(b); *Tennessee Department of Safety and Homeland Security*, FCC File No. 0006812947, Order, 31 FCC Rcd 11675, at 4, para. 10 (PSHSB 2016); *Mobile Relay Associates*, File Nos. 0001398092 and 0002906356, Memorandum Opinion and Order, 23 FCC Rcd 3202, at 4, para. 9 (2008); *Improving Public Safety Communications in the 800 MHz Band*, WT Docket No. 02-55, ET Docket No. 00-258, RM09498, RM-10024, ET Docket No. 95-18, 19 FCC Rcd 25120, 25145 at para. 56 (2004).

⁴⁰¹ 47 CFR pt. 90.

⁴⁰² Utilities Technology Council Comments at 9, 11-12 (arguing that limiting eligibility for B/ILT entities in the narrowband segments will address concerns related to insufficient spectrum available in the narrowband segment to complete relocation and continue operations); Utilities Technology Council Reply at 11 (commenting that the Commission should provide priority access to narrowband channels for B/ILT entities in case there is insufficient spectrum in the narrowband segment to complete relocation); Lower Colorado River Authority Comments at 22-23 (arguing that due to spectrum scarcity in the 900 MHz narrowband segments, the Commission should preserve the spectrum for B/ILT use); Lower Colorado River Authority Reply at 22-23 (agreeing with other commenters that limiting eligibility for the narrowband segments to B/ILT entities would ensure sufficient spectrum is available for relocation and continuing operations).

⁴⁰³ National Association of Manufacturers Comments at 2; UPS Comments at 10; UPS Reply at 9.

⁴⁰⁴ Utilities Technology Council Comments at 12.

⁴⁰⁵ Utilities Technology Council Reply at 11.

protect B/ILT Pool licensees against interference from broadband operations.⁴⁰⁶ Under our current rules, new 900 MHz SMR licenses are issued only through competitive bidding and are geographically licensed.⁴⁰⁷ We clarify that, with the exception of covered incumbents relocated from the broadband segment, SMR licensees, whether site-based or geographically licensed, may only access additional narrowband segment spectrum in transitioned markets through acquisition, consistent with rule section 90.621(f)⁴⁰⁸ regarding conversion of B/ILT Pool licenses through modification or assignment, or by meeting the B/ILT Pool eligibility criteria for its internal business operations. Further, we note, as some commenters suggest, that SMR licensees are not prohibited from seeking additional narrowband licenses in spectrum bands suited for commercial operations.⁴⁰⁹

144. In the *NPRM*, we also sought comment on whether transitioning from the current 12.5 kilohertz channel bandwidth to 6.25 kilohertz channel bandwidth would facilitate relocation of covered incumbents.⁴¹⁰ After review of the record, we will retain the 12.5 kilohertz channel bandwidth in the narrowband segments. Commenters support allocation of 12.5 kilohertz channels in the narrowband segments.⁴¹¹ Commenters are united in their opposition against 6.25 kilohertz channels in the narrowband segments,⁴¹² citing concerns that 6.25 kilohertz channels would degrade service.

D. Technical Rules

1. Broadband Segment

145. *Transmitter power limits.* As discussed in the *NPRM*, in recent proceedings the Commission has applied the power spectral density (PSD)⁴¹³ concept when adopting transmitter power limits, to take into account the availability and deployment of advanced mobile broadband technologies, such as LTE.⁴¹⁴ A PSD model allows greater broadband coverage than non-PSD limits.⁴¹⁵ After review of the record, we adopt the *NPRM*'s proposal and will permit an effective radiated power for base and repeater stations in the 900 MHz broadband segment not to exceed 400 watts/megahertz in non-rural areas and 800 watts/megahertz in rural areas, with maximum permissible power decreasing as the antenna height above average terrain (HAAT) rises above 304 meters.⁴¹⁶

146. We also afford additional flexibility for 900 MHz broadband licensees seeking to operate

⁴⁰⁶ *Id.* at 9.

⁴⁰⁷ 47 CFR § 90.801.

⁴⁰⁸ *Id.* § 90.621(f).

⁴⁰⁹ Utilities Technology Council Comments at 12; Lower Colorado River Authority Comments at 22-23.

⁴¹⁰ *900 MHz NPRM*, 34 FCC Rcd at 1563, para. 36.

⁴¹¹ American Petroleum Institute and the Energy Telecommunications and Electrical Association Comments at 5; Southern California Edison Comments at 13; NextEra Energy, Inc. Comments at 20.

⁴¹² NextEra Energy, Inc. Comments at 20; Critical Infrastructure Coalition Comments at 8; Lower Colorado River Authority Comments at 25; Lower Colorado River Authority Reply at 24; Anterix Comments at 33; American Petroleum Institute and the Energy Telecommunications and Electrical Association Comments at 5; JVCKENWOOD USA Corporation Comments at 10.

⁴¹³ See 47 CFR § 22.99 (defining "power spectral density" to mean "[t]he power of an emission in the frequency domain, such as in terms of ERP or EIRP, stated per unit bandwidth, e.g., watts/MHz").

⁴¹⁴ See, e.g., *Amendment of Parts 1 and 22 of the Commission's Rules with Regard to the Cellular Service, including Changes in Licensing of Unserved Area*, WT Docket Nos. 12-40 *et al.*, Second Report and Order *et al.*, 32 FCC Rcd 2518, 2520, 2535, paras. 2, 40 (2017) (*Cellular Reform Second Report and Order*).

⁴¹⁵ See *id.*

⁴¹⁶ *900 MHz NPRM*, 34 FCC Rcd at 1575, para. 71.

at higher powers than we adopt today, provided they can sufficiently mitigate the risk of interference.⁴¹⁷ Specifically, provided the 900 MHz broadband licensee complies with a modeled power flux density (PFD) of 3000 microwatts/m²/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, we permit 900 MHz broadband base stations to operate with an effective radiated power not to exceed 1000 watts/megahertz in non-rural areas and 2000 watts/megahertz in rural areas and an antenna height above average terrain (HAAT) not to exceed 304 meters (1,000 feet), with the maximum permissible power decreasing as the HAAT rises above 304 meters. The PFD limit was adopted in the 800 MHz Cellular Reform Second Report and Order to provide interference protection for the public safety receivers when higher power limits were permitted for cellular operations, and we believe it will also provide interference protection for 900 MHz narrowband receivers.⁴¹⁸

147. NextEra claims that tests indicate LTE broadband signals will interfere with LMR receivers because LTE operations would cause the sensitivity level to degrade, resulting in near/far interference where an LMR receiver is geographically close to a strong interferer.⁴¹⁹ This claim, however, is contested in the record through the Pericle study and ex parte letters filed by Southern Communications Services and Ameren in response to NextEra's filing.⁴²⁰ Based upon our review of the record, we find that the protection mechanisms we adopt today, such as the power flux density and rules establishing what constitutes unacceptable of interference, are sufficient to mitigate against this type of interference.⁴²¹ We also note that modern LMR systems using improved receivers are less susceptible to harmful interference and that this potential issue is commonly mitigated through careful LTE site selection.

148. We also adopt the proposal to permit an effective radiated power for mobile, control and auxiliary test stations in the broadband segment not to exceed 10 watts, and effective radiated power of portables not to exceed 3 watts. We adopt these effective radiated power limits as proposed, which the record supports.⁴²²

149. *Out of band emission limits.* We establish an out of band emission (OOBE) limit outside a licensee's frequency band of operation to be attenuated by at least $43 + 10 \log(P)$ dB for uplink operations in the 897.5-900.5 MHz band⁴²³ and by at least $50 + 10 \log(p)$ dB for downlink operations in the 936.5-939.5 MHz band.⁴²⁴ These are the limits we proposed in the *NPRM* and are consistent with most other broadband spectrum allocations.⁴²⁵ We adopt a rule that provides authority for the Commission to impose operational restrictions or tighter OOBE limits if necessary to resolve harmful

⁴¹⁷ See *id.* at 1580-94, Appendix A Proposed Rules.

⁴¹⁸ See, e.g., *Cellular Reform Second Report and Order*, 32 FCC Rcd at 2520, 2535.

⁴¹⁹ See Letter from Timothy J. Cooney, Counsel to NextEra Energy, Inc., to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200 (filed Mar. 31, 2020). Lower Colorado River Authority filed in support of NextEra. See Letter from Kevin M. Cookler, Counsel to Lower Colorado River Authority, to Marlene H. Dortch, WT Docket No. 17-200 (filed Apr. 16, 2020).

⁴²⁰ Letter from Elizabeth R. Sachs, Counsel to Anterix, Inc., to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200, Exh. at 4, 25 (filed Oct. 4, 2019) (Anterix Oct. 4 *Ex Parte* or Pericle NOI Comments); Letter from Michael D. Rosenthal, Director of Legal & External Affairs, Southern Linc, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200 (filed Apr. 6, 2020); Letter from John Hughes, Director of Network Engineering and Operations, Ameren Services, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200 (filed Apr. 6, 2020).

⁴²¹ See 47 CFR § 27.1510.

⁴²² See, e.g., Ericson Comments at 5; Utilities Technology Council Comments at 27.

⁴²³ See 47 CFR § 90.669(a).

⁴²⁴ 900 MHz *NPRM*, 34 FCC Rcd at 1576, para. 74.

⁴²⁵ *Id.* at 1603, para. 27. See, e.g., 47 CFR §§ 22.917 (Cellular), 24.238 (Broadband PCS).

interference, which is also similar to that applied in other bands.⁴²⁶

150. Several commenters support the proposed OOB limits,⁴²⁷ while NextEra's Harris Report contends we should adopt more stringent OOB limits.⁴²⁸ In response, Anterix submits comments by Pericle Communications Company claiming to demonstrate that the proposed OOB limits will provide appropriate protection for narrowband operations when combined with the inherent characteristics of an LTE channel (including that LTE handsets operate at significantly lower transmit power than existing narrowband subscriber units and LTE networks maintain significant power control of mobile units for the uplink segment of network transmissions).⁴²⁹ We find that this OOB limit will maintain the current interference environment for 900 MHz narrowband incumbents. We also find that the OOB limits NextEra and Motorola propose are overly conservative and may restrict broadband deployment in certain areas.⁴³⁰

151. In addition, Gogo, the nationwide ATG licensee, seeks more stringent OOB limits to protect its operations from unacceptable interference from adjacent band mobiles.⁴³¹ Gogo's arguments appear to be based on the assumption that the broadband segment would be 5/5 megahertz, an approach we have declined to adopt.⁴³² We find that by adopting a 3/3 megahertz broadband segment with 1.5 megahertz of separation from ATG operations, we have fully addressed Gogo's interference concerns.

152. We also find that the OOB rules we adopt are sufficient to protect narrowband operations within the 900 MHz band and adjacent to the 900 MHz band and to maintain the current interference environment in and around the 900 MHz band.

153. One commenter advocates for additional interference protections, such as requiring 900 MHz broadband licensees to be responsible for preventing and resolving interference to Narrowband Personal Communications Service operations and encouraging licensees to conduct real-world testing simulations prior to deployment.⁴³³ We find that the band plan and interference protections we adopt today are sufficient to protect Narrowband Personal Communications Service operations.

154. After review of the record, we find it unnecessary to adopt a guard band between narrowband and broadband operations in the realigned 900 MHz band, as several 900 MHz band

⁴²⁶ See, e.g., 47 CFR §§ 27.53(n), 90.691(b). Several commenters, including adjacent Narrowband Personal Communications Service licensees and 900 MHz band incumbents, request that we adopt such a rule. See, e.g., Letter from Elizabeth R. Sachs, Counsel to Anterix, Inc., to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200, at 14 (filed Oct. 4, 2019) (Anterix Oct. 4 *Ex Parte* or Pericle NOI Comments); Lower Colorado River Authority Reply at 24-25; Sensus Comments at 5; Space Data Corporation Reply at 2-3.

⁴²⁷ Ericsson Comments at 5; Sensus Comments at 2, 5 (supporting the Commission's authority to impose operational restrictions or stricter OOB limits if necessary to resolve interference); Utilities Technology Council Reply at 22, 28 (supporting the proposed OOB limits).

⁴²⁸ Harris Report at 10-18 (proposing an OOB limit of $76 + 10 \log(P)$ per 6.25 kHz for downlinks for the 900 MHz narrowband segments, with the $50 + 10 \log(P)$ limit applied to spectrum external to the narrowband segments, and an OOB limit of $65 + 10 \log(P)$ per 6.25 kHz for uplinks).

⁴²⁹ Anterix Oct. 4 *Ex Parte* at 2-3, Exh. A (Pericle NOI Comments).

⁴³⁰ Motorola Comments at 4 (proposing an OOB limit of -23 dBm/MHz); UPS *Ex Parte* at 3 (supporting Motorola's OOB proposal).

⁴³¹ Gogo *Ex Parte* at 3-4; Letter from Michele C. Farquhar, Counsel, Gogo Inc., to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200 (filed March 11, 2020) (Gogo March 11, 2020 *Ex Parte*).

⁴³² See Gogo Comments at 3.

⁴³³ See Space Data Reply at 2-3. We note that licensees are not prohibited from conducting the testing Space Data proposes prior to deployment.

incumbents propose.⁴³⁴ We find that the adoption of the above technical rules, coupled with the technical characteristics of the 900 MHz band's 3/3 megahertz broadband deployment, provide sufficient protection to adjacent and in-band licensees. In particular, the 3GPP standard for a 3/3 megahertz broadband deployment specifies only a 2.7 MHz occupied bandwidth, providing a 150 kHz in-band spectral buffer on each side adjacent to the narrowband segments. Further, we find Southern Linc's real-world deployment experience and lab testing supports our determination that a guard band between the narrowband and broadband operations is unnecessary.⁴³⁵

155. NextEra argues that the Harris and GP&A technical studies it submitted demonstrate that a guard band is needed between 900 MHz narrowband and broadband operations because the broadband operations will cause increased unacceptable interference to adjacent narrowband users.⁴³⁶ NextEra also argues that, because the Commission provided a guard band of approximately 1 megahertz from the band edges in the 700 and 800 MHz bands, where LTE signals were likely to be deployed, we should provide one in the 900 MHz band.⁴³⁷

156. We find that NextEra's technical studies fail to demonstrate unacceptable interference to narrowband operations. *First*, the studies include mostly generic statements regarding potential for interference and fail to demonstrate in a quantifiable way that actual receivers are incapable of normal operation in the absence of a guard band.⁴³⁸ *Second*, the studies rely substantially on the Commission's decisions to provide a guard band at 700 and 800 MHz, which are distinguishable from the 900 MHz band. Modern part 90 receivers are better designed to filter unwanted emissions than those in operation during the 700 MHz and 800 MHz proceedings, and 900 MHz receivers are well-equipped to deal with a single, strong broadband interferer.⁴³⁹ In this respect, we note that Pericle Communications Company measured receiver-induced interference rejection for three typical 900 MHz subscriber radios, and found that the performance at 900 MHz with a single LTE carrier and no guard band is equal to the performance at 800 MHz with two broadband carriers and a 2 megahertz guard band.⁴⁴⁰ In addition, we note that a broadband licensee has a wide range of situation-specific tools it may employ to avoid unacceptable interference (e.g., spectral separation, filtering, base station locating, and co-locating sites), and we expect licensees to use these tools and to work together to resolve any interference issues.

157. We find it unnecessary to adopt additional limits on LTE transmitter power and transmitter filtering requirements, given the technical rules we adopt today.⁴⁴¹ No commenter suggested additional limits on LTE transmitter power and filtering requirements. Ericsson and UTC support the effective radiated power (ERP) that we adopt in this *Report and Order*.⁴⁴² We find that adjacent

⁴³⁴ FirstEnergy Comments at 6; Lower Colorado River Authority Comments at 5, 9, 21-22; Lower Colorado River Authority Reply at 5, 11-12; NextEra Energy, Inc. Comments at 6; NextEra Energy, Inc. Reply at 2, 6-8; Utilities Technology Council Comments at 7-8, 13; Utilities Technology Council Reply at 7-8, 10. These comments all cite to the NextEra Harris Report at 19-20, 22 and NextEra GP&A Report at 17; *see also* Ad Hoc Refiners Feb. 25, 2020 *Ex Parte* (urging the Commission to study the need for a guard band to protect existing incumbent uses).

⁴³⁵ Letter from Michael D. Rosenthal, Director of Legal & External Affairs, Southern Linc, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200, at 1-2 (filed Dec. 11, 2019).

⁴³⁶ NextEra Energy, Inc. Comments at 10.

⁴³⁷ *Id.* at 10.

⁴³⁸ *See* NextEra Harris Report and NextEra GP&A Report.

⁴³⁹ Letter from Elizabeth R. Sachs, Counsel to Anterix, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200 at 1 (filed Sept. 17, 2019); Pericle NOI Comments at 10.

⁴⁴⁰ Pericle NOI Comments at 5.

⁴⁴¹ *See Appendix* at §§ 27.1507-10.

⁴⁴² Ericsson Comments at 5; UTC Comments at 26.

narrowband and broadband operations will not require replacement or additional equipment or hardware and software upgrades to narrowband equipment; the record was silent on this matter. Further, we find that the technical parameters for the 900 MHz broadband segment are consistent with the interference resistance of current 900 MHz narrowband radio equipment and systems, and that they will help ensure adequate interference protection to narrowband operations. Anterix's comments reflect support for this approach.⁴⁴³

158. *Interference protections and resolution.* As proposed, co-channel broadband systems must comply with existing 900 MHz co-channel separation requirements, which require that co-channel systems generally comply with a minimum spacing criteria of at least 113 kilometers (70 miles) separation distance between base stations.⁴⁴⁴ While no commenter objects to the minimum spacing criteria proposed in the *NPRM*, Oncor Electric Delivery Company LLC contends it is uncertain that this separation distance will protect 900 MHz narrowband operations from 900 MHz broadband operations.⁴⁴⁵ We find that the co-channel separation distance criteria of section 90.621(b) is sufficient to protect site-based narrowband operations, and note that the record does not reflect any technical data demonstrating that this separation distance will be inadequate to minimize co-channel interference.⁴⁴⁶

159. We also find it in the public interest to require broadband licensees to prevent harmful interference⁴⁴⁷ to narrowband operations and to resolve any unacceptable interference in the shortest time practicable.⁴⁴⁸ We sought comment in the *NPRM* on a definition of harmful interference as receiving a median desired signal strength of -98 dBm or higher as measured at the RF input of the receiver of a mobile unit, or -95 dBm or higher as measured at the RF input of the receiver of a portable station (hand-held device) and that we account for environmental noise by incorporating fade margins of 10 dB.⁴⁴⁹ We also sought comment on whether to adopt technical standards and procedures that more closely align with the existing rules regarding unacceptable interference to non-cellular 800 MHz licensees from 800 MHz cellular systems or part 22 Cellular Radiotelephone systems.⁴⁵⁰

160. Several incumbent commenters support a definition of unacceptable interference that aligns the interference criteria in the 900 MHz band with that was used in the 800 MHz band, which defines unacceptable interference as a median desired signal strength of -104 dBm or higher as measured at the RF input of the receiver of a mobile unit, or -101 dBm or higher as measured at the RF input of the receiver of a portable station.⁴⁵¹

161. We agree with these commenters and find it in the public interest to adopt this definition

⁴⁴³ Anterix Reply at 15.

⁴⁴⁴ 900 MHz *NPRM*, 34 FCC Rcd at 1576, para. 73 (citing 47 CFR § 90.621(b)).

⁴⁴⁵ Oncor Electric Delivery Company LLC Comments at 11.

⁴⁴⁶ *Id.* at 12 (noting that it “acknowledges that it does not have the answer to this highly technical question”).

⁴⁴⁷ Under the Commission's rules, harmful interference is defined as “[i]nterference which endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service operating in accordance with [the ITU] Radio Regulations.” 47 CFR § 2.1(c).

⁴⁴⁸ 900 MHz *NPRM*, 34 FCC Rcd at 1576, para. 73.

⁴⁴⁹ *Id.*

⁴⁵⁰ *Id.*

⁴⁵¹ See 47 CFR 90.672(a)(1)(i)(A)-(B); Critical Infrastructure Coalition Comments at 7-8; NextEra Energy, Inc. Comments at 19; Utilities Technology Council Reply at 21; see also Anterix Oct. 4 *Ex Parte* at 4 (“[T]o accommodate the desires of [] incumbents and to align the thresholds for 800 and 900 MHz narrowband services, Anterix does not oppose adoption of the more relaxed [interference claim threshold].”).

as it affords additional protection to narrowband licensees. Specifically, we require 900 MHz broadband licensees to comply with new rule section 27.1510 and revised section 90.672(a)'s definition of unacceptable interference and resolution requirements. In new rule section 27.1510, we deem unacceptable interference to 900 MHz narrowband licensees as occurring when the applicable median desired signal level is measured to be -104 dBm or higher at the RF input of narrowband licensees' mobile receivers and -101 dBm or higher at the RF input of narrowband licensees' portable receivers. Section 90.672(a)(1)(i)(A)-(B) currently defines unacceptable interference in the 900 MHz B/ILT Pool as receiving a median desired signal strength of -88 dBm or higher as measured at the RF input of the receiver of a mobile unit, or -85 dBm or higher as measured at the RF input of the receiver of a portable station.⁴⁵²

162. *Canada/Mexico border operations.* 900 MHz licensees with operations in the United States/Mexico and United States/Canada border regions are subject to, and shall be in accordance with, international agreements between the United States and Mexico and the United States and Canada.⁴⁵³ The existing agreements were designed for narrowband operations, as broadband operations in the band did not exist and were not contemplated at the time the agreements were negotiated.⁴⁵⁴ However, 900 MHz broadband licensees seeking to operate in border regions remain subject to the United States' current agreements with Canada and Mexico. These include, as applicable, limitations on channel usage, as 900 MHz channels are divided between countries on a primary and secondary basis, and it is likely that a 900 MHz broadband license in the border area would be operating on both U.S. primary channels and channels that are secondary to Mexican and/or Canadian operations. Further, a 900 MHz broadband licensee will be subject to current power restrictions, which for primary licensees vary based on antenna height, and for secondary licensees include more restrictive power flux density limits. Future broadband licensees in the 900 MHz band also will be subject to any international agreements governing border-area operations. We received no comments on operations in the Canada/Mexico border region.

163. *Field strength limit.* We establish a median field strength limit not to exceed 40 dBμV/m at any given point along the geographic license boundary in the broadband segment, unless the affected licensee agrees to a different field strength limit.⁴⁵⁵ This limit corresponds to the current field strength limit at the border between co-channel 900 MHz SMR licensees.⁴⁵⁶ The Utilities Technology Council supports this median field strength proposal, and no commenter objects to it.⁴⁵⁷

2. Narrowband Segments

164. We find that the existing part 90 technical rules are well-suited for narrowband operations in the newly designated paired narrowband segments. We sought comment in the *NPRM* on whether the existing part 90 technical rules should be applied to narrowband operations in the newly

⁴⁵² 47 CFR § 90.672(a)(1)(i)(A)-(B).

⁴⁵³ 900 MHz *NPRM*, 34 FCC Rcd at 1575, para. 71.

⁴⁵⁴ See Sharing Arrangement Between the Department of Communications of Canada and the Federal Communications Commission of the United States of America Concerning the Use of the Bands 896-901 MHz and 935-940 MHz Along the Canada-United States Border (August 15, 1990), available at https://transition.fcc.gov/ib/sand/agree/files/can-nb/896_940.pdf; Protocol Between The Department Of State Of The United States Of America And The Secretariat Of Communications And Transportation Of The United Mexican States Concerning the Allotment, Assignment and Use of The 806-824/851-869 MHz and 896-901/935-940 MHz Bands for Terrestrial Non-Broadcasting Radiocommunication Services Along the Common Border (June 8, 2012) available at https://transition.fcc.gov/ib/sand/agree/files/mex-nb/806_896.pdf.

⁴⁵⁵ 900 MHz *NPRM*, 34 FCC Rcd at 1575, para. 72.

⁴⁵⁶ See 47 CFR § 90.671.

⁴⁵⁷ Utilities Technology Council Comments at 27.

designated paired narrowband segments.⁴⁵⁸ Specifically, given the proposal to eliminate the distinction between B/ILT and SMR blocks in the narrowband segment in transitioned markets, we sought comment on whether new and existing narrowband licensees need additional or modified interference protections.⁴⁵⁹

165. Although we eliminate the distinction between B/ILT and SMR blocks in the narrowband segment in transitioned markets, we find that no additional or modified interference protections are necessary. Where a county has been transitioned to the new broadband segment and shares a border with a county that has not transitioned to broadband, we find that narrowband licensees in the non-transitioned county do not require modified interference protection from the newly licensed co-channel broadband operations. Moreover, we find narrowband licensees operating on a protected basis in the broadband segment of a transitioned county, subject to the protections adopted herein, do not require additional protections. Some commenters claim that interference protections, beyond those provided in the current rules, are warranted.⁴⁶⁰ For example, NextEra asserts that caution must be exercised in defining the interference criteria, especially in a band where narrowband and broadband operations are adjacent to each other without a guard band, and urges the Commission to adopt the interference criteria used in the 800 MHz band.⁴⁶¹ UTC agrees that the interference protections used in the 800 MHz band would be appropriate because the 800 MHz band “closely aligns with the interference environment and configuration of the band” proposed by the Commission in the 900 MHz realignment.⁴⁶² Several commenters support the interference protection levels used for 800 MHz, which define unacceptable interference as “a median desired signal strength of -104 dBm or higher as measured at the radiofrequency input of the receiver of a mobile unit, or -101 dBm or higher as measured at the radiofrequency input of the receiver of a portable station.”⁴⁶³ While we agree with commenters’ concerns regarding the potential for interference and importance of protecting narrowband operations, we find that the existing safeguards in the part 90 rules are sufficient to protect against and resolve these interference concerns. Furthermore, and as previously noted, the technical parameters governing the 900 MHz broadband segment are consistent with the interference resistance of current 900 MHz narrowband radio equipment and systems, which we find will ensure adequate interference protection to narrowband incumbents.

E. Cost-Benefit Analysis

166. The negotiation-based process we adopt today requires the prospective broadband licensee to reach agreements to acquire, relocate, or provide interference protection to, incumbents up to the 90% success threshold. Three filings were submitted that address the benefits and costs associated

⁴⁵⁸ 900 MHz NPRM, 34 FCC Rcd at 1577, para. 76.

⁴⁵⁹ *Id.* at 1577, para. 76

⁴⁶⁰ See, e.g., Sensus Comments at 6; Space Data Reply at 2; Utilities Technology Council Reply at 8; see also Utilities Technology Comments; LADWP Comments, Motorola Comments, Alliant Comments, Oncor Comments, NextEra Comments; National Association of Manufacturers Comments, Critical Infrastructure Coalition Comments, Duke Energy Comments; Southern California Edison Comments; UPS Comments; Lower Colorado River Authority Comments; National Rural Electric Cooperative Association Comments (all commenters arguing for incumbent protections).

⁴⁶¹ NextEra Comments at 19.

⁴⁶² Lower Colorado River Authority Reply at 23.

⁴⁶³ Utilities Technology Council Comments at 21; see also Lower Colorado River Authority Reply at 23; Critical Infrastructure Coalition Comments at 7.

with realigning the 900 MHz band, which we discuss in turn.⁴⁶⁴

167. *Record.* Dr. Furchtgott-Roth, on behalf of Anterix, argues that no relevant costs have been identified in the record because relocation costs should be classified as equity considerations rather than costs.⁴⁶⁵ To calculate the benefits, Dr. Furchtgott-Roth employs a Wells Fargo study that values Sprint's 14 megahertz of 800 MHz spectrum at between \$0.50 and \$2.25 per MHz pop.⁴⁶⁶ Applying the Wells Fargo economic valuation to the six megahertz of spectrum in the 900 MHz band and using an annual spectrum value multiplier, Dr. Furchtgott-Roth estimates the net present value of the spectrum to society is between \$10 and \$20 billion.⁴⁶⁷

168. Dr. Bazelon, on behalf of NextEra, analyzes only those markets where the Florida Power and Light Company (FPL) currently holds licenses.⁴⁶⁸ Dr. Bazelon separates the costs associated with the repurposing of the 900 MHz spectrum into four categories: (i) one-time transitioning costs, (ii) ongoing costs borne by FPL, (iii) non-monetary costs associated with "performance and safety," and (iv) external costs to society. Dr. Bazelon argues that categories (iii) and (iv) are not covered under the EWA/Anterix proposal because they affect society and not the incumbent licensee.⁴⁶⁹ Dr. Bazelon estimates a present value of \$97 million in one-time and ongoing costs from categories (i) and (ii).⁴⁷⁰ To estimate the benefits, Dr. Bazelon multiplies the average MHz-pop price for 600 MHz spectrum generated by FCC Auction 1000 in the counties where FPL holds licenses by the total MHz-pops for the 900 MHz band in those counties.⁴⁷¹ Dr. Bazelon estimates \$83 million in benefits within the FPL service area, which when weighed against the one-time and ongoing costs result in negative \$15 million in net benefits.⁴⁷²

169. Finally, Dr. Ford, on behalf of Anterix, after arguing that parties only agree to a sale if the prospective licensee values the spectrum more than the incumbent,⁴⁷³ contends that formal cost-benefit analyses are not necessary "when market transactions determine the outcome" and there are no "large third-party effects or antitrust concerns."⁴⁷⁴ Dr. Ford further argues that, in the case of the 900

⁴⁶⁴ Letter from Elizabeth R. Sachs, Counsel to pdvWireless, Inc., to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200, Attach. at 2-23 (filed Nov. 9, 2017) (Anterix Nov. 9, 2017 *Ex Parte*); Letter from Bryan N. Tramont and Timothy J Cooney, Counsel to NextEra Energy, Inc., to Marlene H. Dortch, Secretary, FCC, WT Docket No. 17-200, Enc. at 1-47 (filed Sept. 14, 2018) (NextEra Sept. 14, 2018 *Ex Parte*); Anterix Oct. 9 *Ex Parte*.

⁴⁶⁵ Anterix Nov. 9, 2017 *Ex Parte* at 13-15.

⁴⁶⁶ *Id.* at 20; Wells Fargo Wireless Spectrum Primer, Second Edition (June 2017), Exhibit 10.

⁴⁶⁷ Anterix Nov. 9, 2017 *Ex Parte* at 20-21. Dr. Furchtgott-Roth's choice of annual spectrum value multiplier is based on Bazelon, C. & McHenry, G. (2015). Mobile Broadband Spectrum: A Vital Resource for the American Economy, CTIA, at 16.

⁴⁶⁸ See NextEra Sept. 14, 2018 *Ex Parte*.

⁴⁶⁹ *Id.* at 22-23, para. 38.

⁴⁷⁰ *Id.* at 29-32, paras. 52-56.

⁴⁷¹ *Id.* at 37-39, paras. 64-66. Dr. Bazelon does not include valuations for cost categories (iii) and (iv). Conducted in 2016, Auction 1000 was composed of a reverse auction- Auction 1001- where television broadcasters offered to voluntarily relinquish some or all of their 600 MHz band spectrum usage rights and forward auction-Auction 1002- where flexible-use licenses suitable for providing mobile broadband services were auctioned. See *Application Procedures for Broadcast Incentive Auction Scheduled to Begin on March 29, 2016*, AU Docket No. 14-252, GN Docket No. 12-268, WT Docket No. 12-269, Public Notice, 30 FCC Rcd 11034 (2015).

⁴⁷² NextEra Sept. 14, 2018 *Ex Parte* at 43, para. 79.

⁴⁷³ See Anterix Oct. 9 *Ex Parte*.

⁴⁷⁴ *Id.* at 7.

MHz band, benefits are likely to be large due to the deployment of currently fallow spectrum,⁴⁷⁵ and any costs are likely to be small because the relocation process is straightforward and incumbents can use alternative spectrum to provide the same services.⁴⁷⁶

170. *Discussion.* First, we reject Dr. Furchtgott-Roth's argument that relocation costs are transfer payments that should not be considered in a cost-benefit analysis. For the relocation payments to qualify as transfer payments, OMB states that they be "payments from one group to another that do not affect total resources available to society."⁴⁷⁷ We note that, while the relocation costs are paid from the prospective licensee to the incumbent, the incumbent must use these funds to purchase new equipment, and thus they should be considered costs and not transfer payments since they affect the total resources available. Second, Dr. Bazelon's estimate of benefits focuses solely on the spectrum's change in market value, and it fails to consider any societal benefits that may arise from realigning the band and therefore very likely underestimates the benefits of our policy. Various empirical studies have found that spectrum's value to society is many times greater than its market value.⁴⁷⁸ Using the numbers in Dr. Bazelon's cost-benefit analysis of the FPL service territory, the benefits to society need only be greater than \$15 million within the FPL service area to offset the costs.⁴⁷⁹ Furthermore, if the relocation costs exceed the private benefits as claimed by Dr. Bazelon, then as noted by Dr. Ford, under the approach we adopt herein no voluntary clearing agreement would be reached; therefore the negative net benefits claimed by Dr. Bazelon would not occur.

171. As noted by Dr. Ford, because relocation is voluntary up to the 90% success threshold, if the negotiating parties reach an agreement, this implies that both the incumbent and the prospective licensee will be better off. If the benefits of the bargain do not make both parties better off, no agreement will be reached. This implies that, as long as the agreements do not make non-parties to the agreements worse off on net, for which there is no evidence in the record that such negative externalities exist, the benefits to society outweigh the costs, and no formal cost-benefit analysis is necessary.⁴⁸⁰ Beyond the 90% success threshold, mandatory relocation occurs only if comparable facilities are available. As a result, with relocation costs covered, we believe that the incumbent licensees are likely to be no worse off—and that the broadband licensee would be willing to incur those costs only if the benefits of the broadband license outweigh those costs.⁴⁸¹ As such, our adopted approach assures that the benefits of repurposing the spectrum exceed the costs, absent significant negative externalities to any other parties, for which we have no record evidence. Therefore, and in agreement with Dr. Ford, it is not necessary to estimate explicitly the difference between benefits and costs to determine that the benefits of our policy exceed the costs. Where negotiations to transition the band to broadband are successful, the benefits of

⁴⁷⁵ *Id.* at 5.

⁴⁷⁶ *Id.* at 5. We note that while it may not be necessary to show welfare improvements for bargaining parties participating in voluntary transactions, factors that are not internalized by the parties may be important. For instance, the Commission may be interested in the speed at which the spectrum is repurposed, in such a case the mechanism by which the spectrum rights are sold may be important.

⁴⁷⁷ Office of Management and Budget, *Circular A-4*, at 38 (Sept. 17, 2003) https://obamawhitehouse.archives.gov/omb/circulars_a004_a-4/.

⁴⁷⁸ See, e.g., Hazlett, T. & Munoz, R., A welfare analysis of spectrum allocation policies, *RAND Journal of Economics*, 40(3) (2009); Rosston, G., The long winding road: the FCC paves the path with good intentions, *Telecommunications Policy* 27 (2003).

⁴⁷⁹ NextEra Energy, Inc. Sept. 14, 2018 *Ex Parte* at 43, para. 78.

⁴⁸⁰ In fact, even if there were net costs to non-parties to the agreements, the policy would still be beneficial to society overall if these costs were less than the benefits to the parties to the agreement.

⁴⁸¹ There may be costs associated with negotiating with the prospective licensee during both the voluntary and mandatory periods. We assume, however, that these costs are less than the benefits from receiving new facilities.

deploying broadband using 900 MHz spectrum are likely to be substantially higher than the costs that are imposed; and where negotiations are unsuccessful, the net cost will be zero.

IV. ORDER DENYING EWA PETITION FOR RULEMAKING

172. The Enterprise Wireless Alliance (EWA) filed a Petition for Rulemaking (Petition) requesting that the Commission designate the part 90 800 MHz Guard Band spectrum as “green space” for the relocation of certain 900 MHz narrowband channels.⁴⁸² While EWA supports the creation of a 900 MHz broadband service, it argues that designating the part 90 800 MHz Guard Band as green space for certain 900 MHz narrowband channels “could accelerate the voluntary negotiation process” because some incumbents might prefer to relocate to the 800 MHz band.⁴⁸³ No comments were filed on this petition. We deny EWA’s request.⁴⁸⁴

173. Due to recent actions taken by the Public Safety and Homeland Security Bureau and the Wireless Telecommunications Bureau (collectively the Bureaus), granting the request would not further the public interest because the requested action would not provide any meaningful relief. In April 2019, the Bureaus released for licensing the Expansion Band and Guard Band channels in the 800 MHz band in 24 of the 35 National Public Safety Planning Advisory Committee (NPSPAC) regions where Expansion Band and Guard Band licensing had not already commenced.⁴⁸⁵ Because there are no longer large reserves of regions that the Commission may designate for EWA’s proposed use, the requested action would not provide any meaningful relief to justify a rulemaking proceeding.

174. Moreover, to the extent that EWA requests that the Commission designate for reallocation those areas that have not yet been opened for licensing, Guard Band channels are not available as green space because they are currently subject to an application freeze. In 2017, the Public Safety and Homeland Security Bureau extended the freeze on new 800 MHz applications along the U.S.-Mexico border.⁴⁸⁶ This freeze remains in effect. Additionally, even if the Guard Band spectrum were available in these regions, having different eligibility requirements for Guard Band spectrum in different regions would make the already complicated 800 MHz licensing scheme even more complex and outweigh any partial benefit.⁴⁸⁷ We therefore conclude that a rulemaking proceeding is not warranted and

⁴⁸² Petition for Rulemaking of the Enterprise Wireless Alliance, RM-11837, 1-2, 6-8 (filed April 17, 2019), <https://ecfsapi.fcc.gov/file/1042267087129/RM-11837.pdf> (EWA Petition). Part 90 800 MHz Guard Band spectrum refers to spectrum located between 816-817/861-862 MHz. See 47 CFR pt. 90, subpart S; *800 MHz Public Safety Report and Order*, 19 FCC Rcd at 15054, para. 157. The 900 MHz narrowband channels at issue refer to spectrum located between 896-901/935-940 MHz. The Petition also requests that the Commission designate the part 90 800 MHz Guard Band spectrum as “green space” for the relocation of Business/Industrial/Land Transportation (B/ILT) incumbents operating on 470-512 MHz (T-Band) channels. EWA Petition at 1-2, 4-6, 8. The reasons for denying the Petition apply equally to using part 90 800 MHz Guard Band spectrum for 900 MHz narrowband channels as it does for T-Band channels.

⁴⁸³ EWA Petition at 2, 7-8.

⁴⁸⁴ 47 CFR § 1.401(e).

⁴⁸⁵ See *Public Safety and Homeland Security Bureau and Wireless Telecommunications Bureau Announce the Availability of Additional Sprint Vacated Channels and the Availability of Expansion Band and Guard Band Channels in Certain NPSPAC Regions*, WT Docket No. 02-55, Public Notice, 34 FCC Rcd 2476, 2482, 2485, 2488 (PSHSB/WTB 2019) (*800 MHz Public Notice*). These regions include most of the largest markets, including New York City, Chicago, Philadelphia, and Washington, DC. *Id.* at 2488.

⁴⁸⁶ See *Public Safety and Homeland Security Bureau Extends 800 MHz Application Freeze along Border with Mexico*, WT Docket No. 02-55, Public Notice, 32 FCC Rcd 1817, 1817 (PSHSB 2017) (*Border Freeze Public Notice*).

⁴⁸⁷ Cf. *Creation of Interstitial 12.5 Kiloherertz Channels in the 800 MHz Band Between 809-817/854-862 MHz; Amendment of Part 90 of the Commission’s Rules to Improve Access to Private Land Mobile Radio Spectrum; Land* (continued....)

deny EWA's Petition.

V. ORDER ANNOUNCING PARTIAL LIFTING OF FREEZE

175. By this *Order*, we announce that, for a limited purpose, we are lifting the temporary freeze on the acceptance of certain applications related to part 90 services operating in the 900 MHz band.⁴⁸⁸ The 900 MHz application freeze was imposed initially in September 2018 to preserve the landscape of authorized operations in band pending Commission action.⁴⁸⁹ Today, we are adopting rule changes to promote next generation broadband technologies and services in the 900 MHz band. Accordingly, we find it necessary and in the public interest to partially lift the freeze, effective as of the adoption of this *Order*,⁴⁹⁰ for the limited purpose of permitting covered incumbents to file applications to relocate their operations to different frequencies or locations and transition 900 MHz operations, provided the application is described in a Transition Plan for a broadband applicant or related to an agreement with a broadband license after license grant (e.g., as part of mandatory relocation). Provided the above criteria are met, an applicant seeking license modification to relocate from the broadband segment will not be required to separately include with its application a request for waiver of the current freeze.

176. We recognize that, in the *NPRM*, we proposed directing the Wireless Telecommunications Bureau to waive the B/ILT application freeze to permit incumbents to file applications to relocate their 900 MHz narrowband operations upon the grant of a broadband license.⁴⁹¹ We conclude, however, that it is in the public interest to expand the freeze exception to cover license modifications for relocation purposes tied to prospective broadband licensees' transition plans. This approach provides certainty to prospective applicants as well as administrative efficiencies for applicants and the Commission. We also direct the Wireless Telecommunications Bureau to further adjust the freeze, if necessary, to implement the broadband transition as needed. Some commenters agree that the Commission should lift the freeze to accommodate incumbent relocations.⁴⁹² Other commenters argue that we should lift the freeze altogether or for certain exceptions, such as for complex systems or demonstrated business reasons.⁴⁹³ We find it in the public interest to maintain the current freeze on new and modified B/ILT licenses except for relocation purposes tied to prospective broadband licensees' transition plans because doing so enables a more efficient transition to the provision of broadband through a realigned 900 MHz band.

VI. PROCEDURAL MATTERS

177. *Paperwork Reduction Analysis.* This *Report and Order* contains new or modified information collection requirements subject to the Paperwork Reduction Act of 1995 (PRA), Public Law No. 104-13. It will be submitted to the Office of Management and Budget for review under section

(Continued from previous page) _____

Mobile Communications Council Petition for Rulemaking Regarding Interim Eligibility for 800 MHz Expansion Band and Guard Band Frequencies, WP Docket No. 15-32, Report and Order and Order, 33 FCC Rcd 10222, 10244-45, para. 57 (2018) (declining to grant the LMCC petition in part due to the complexity issue).

⁴⁸⁸ See *900 MHz Freeze Public Notice*, 33 FCC Rcd at 8736.

⁴⁸⁹ See *id.* at 8735.

⁴⁹⁰ The Order Announcing Partial Lifting of Freeze is procedural in nature and, therefore, is not subject to the effective-date requirement of the Administrative Procedure Act. See 5 U.S.C. § 553(d).

⁴⁹¹ On September 13, 2018, the Wireless Telecommunications Bureau suspended the acceptance of applications for new or expanded 900 MHz operations to maintain a stable landscape while the Commission determines how to proceed with the 900 MHz band. See *900 MHz Freeze Public Notice*, 33 FCC Rcd at 8735-36.

⁴⁹² See Southern Company Comments at 7; Southern California Edison Comments at 12.

⁴⁹³ See UPS Comments at 4; Lower Colorado River Area Comments at 14; Oncor Electric Delivery Company LLC Comments at 2, 14.

3507(d) of the PRA. OMB, the general public, and other Federal agencies will be invited to comment on the new information collection requirements contained in this proceeding. In addition, pursuant to the Small Business Paperwork Relief Act of 2002, Public Law 107-198, *see* 47 U.S.C. § 3506(c)(4), we asked for specific comment on how we might further reduce the information collection burden for small business concerns with fewer than 25 employees in the *NPRM*,⁴⁹⁴ and we received no comment.

178. In the present document, we have assessed the effects of rules providing for the realignment of the 900 MHz band to create a new broadband segment and to reserve the remainder of the 900 MHz band for continued narrowband operations, and find that the adopted rule changes impose new or additional reporting or recordkeeping and/or other compliance obligations for small entities as well as other applicants and licensees.

179. *Congressional Review Act.* [The Commission will submit this draft *Report and Order* to the Administrator of the Office of Information and Regulatory Affairs, Office of Management and Budget, for concurrence as to whether this rule is “major” or “non-major” under the Congressional Review Act, 5 U.S.C. § 804(2).] The Commission will send a copy of this *Report and Order*, *Order of Proposed Modification*, and *Orders* to Congress and the Government Accountability Office pursuant to 5 U.S.C. § 801(a)(1)(A).

180. *Regulatory Flexibility Act.* The Regulatory Flexibility Act of 1980, as amended (RFA),⁴⁹⁵ requires that an agency prepare a regulatory flexibility analysis for notice and comment rulemakings, unless the agency certifies that “the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities.”⁴⁹⁶ Accordingly, we have prepared a Final Regulatory Flexibility Analysis (FRFA) concerning the possible impact of the rule changes contained in this *Report and Order* on small entities. The FRFA is set forth in Appendix B.

VII. ORDERING CLAUSES

181. Accordingly, IT IS ORDERED that, pursuant to Sections 1, 2, 4(i), 4(j), 5(c), 302, 303, 304, 307, 308, 309, 310, 316, 319, 324, 332, and 333 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 151, 152, 154(i), 154(j), 155(c), 302, 303, 304, 307, 308, 309, 310, 316, 319, 324, 332, and 333, this *Report and Order*, *Order of Proposed Modification*, and *Orders*, in WT Docket No. 17-200 IS HEREBY ADOPTED.

182. IT IS FURTHER ORDERED that the rules and requirements adopted herein WILL BECOME EFFECTIVE thirty (30) days after publication in the Federal Register, with the exception of sections 27.1503 and 27.1505. Sections 27.1503 and 27.1505 contain new or modified information collection requirements that require review by the Office of Management and Budget (OMB) under the Paperwork Reduction Act. The Commission directs the Wireless Telecommunications Bureau to announce the effective date of those information collections in a document published in the Federal Register after the Commission receives OMB approval, and directs the Wireless Telecommunications Bureau to cause Sections 27.1503 and 27.1505 to be revised accordingly.

183. IT IS FURTHER PROPOSED that, pursuant to sections 4(i) and 316(a) of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 316(a), and section 1.87(a) of the Commission’s rules, 47 C.F.R. § 1.87(a), in the *Order of Proposed Modification* the Commission proposes that Association of American Railroads’ 900 MHz nationwide ribbon license BE MODIFIED pursuant to the conditions in this *Report and Order*, *Order of Proposed Modification*, and *Orders* at

⁴⁹⁴ 900 MHz *NPRM*, 34 FCC Rcd 1578-79, para. 83.

⁴⁹⁵ *See* 5 U.S.C. §§ 601–612. The RFA has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

⁴⁹⁶ 5 U.S.C. § 605(b).

[paragraphs 93-104]. Pursuant to section 316(a) of the Communications Act of 1934, as amended, 47 U.S.C. § 316(a), and section 1.87(a) of the Commission's rules, 47 C.F.R. § 1.87(a), publication of this *Report and Order, Order of Proposed Modification, and Orders* in the Federal Register shall constitute notification in writing of the proposed action and the grounds and reasons therefor. AAR and any other party seeking to file a protest pursuant to Section 316 shall have 30 days from publication to protest such *Order of Proposed Modification*.

184. IT IS FURTHER ORDERED that, pursuant to sections 4(i) and 316(a) of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 316(a), and section 1.87(a) of the Commission's rules, 47 C.F.R. § 1.87(a), the proposed modification of the Association of American Railroads' 900 MHz nationwide ribbon license will be final and effective 60 days after publication of this *Report and Order, Order of Proposed Modification, and Orders* in the Federal Register, provided, however, that in the event the Association of American Railroads or any other licensee or permittee who believes that its license or permit would be modified by this proposed action seeks to protest this proposed modification, the proposed license modification specified in this *Report and Order, Order of Proposed Modification, and Orders* and contested by the licensee shall not be made final as to such licensee unless and until the Commission orders otherwise.

185. IT IS FURTHER ORDERED that the license modification proceeding commenced by the Order of Proposed Modification be treated as a permit-but-disclose proceeding under the Commission's *ex parte* rules. See 47 CFR § 1.1200 *et seq.*

186. IT IS FURTHER ORDERED that, pursuant to section 1.425 of the Commission's rules, 47 C.F.R. § 1.425, the Enterprise Wireless Alliance (EWA) Petition for Rulemaking is DENIED.

187. IT IS FURTHER ORDERED that, pursuant to section 4(i) of the Communications Act of 1934, as amended, 47 U.S.C. § 154(i), and section 1.925 of the Commission's rules, 47 CFR § 1.925, the Order announcing a partial lifting of the 900 MHz application freeze is ADOPTED and SUBJECT TO the conditions specified herein.

188. IT IS FURTHER ORDERED that, pursuant to 47 CFR § 1.4(b)(1), the period for filing petitions for reconsideration or petitions for judicial review of this *Report and Order, Order of Proposed Modification, and Orders* will commence on the date that a summary of this *Report and Order, Order of Proposed Modification, and Orders* is published in the Federal Register.

189. IT IS FURTHER ORDERED that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, SHALL SEND a copy of this *Report and Order, Order of Proposed Modification, and Orders* to Congress and the Government Accountability Office pursuant to the Congressional Review Act, see 5 U.S.C. § 801(a)(1)(A).

190. IT IS FURTHER ORDERED that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, SHALL SEND a copy of this *Report and Order, Order of Proposed Modification, and Orders*, including the Final Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

191. It is our intention in adopting these rules that, if any provision of the *Report and Order, Order of Proposed Modification, and Orders* or the rules, or the application thereof to any person or circumstance, is held to be unlawful, the remaining portions of such *Report and Order, Order of Proposed Modification, and Orders* and the rules not deemed unlawful, and the application of the *Report and Order, Order of Proposed Modification, and Orders* and the rules to other persons or circumstances, shall remain in effect to the fullest extent permitted by law.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

APPENDIX A

Final Rules

For the reasons set forth above, Parts 1, 2, 20, 27 and 90 of the Code of Federal Regulations is amended as follows:

PART 1 – PRACTICE AND PROCEDURE

1. The authority citation for part 1 continues to read as follows:

Authority: 47 U.S.C. chs. 2, 5, 9, 13; 28 U.S.C. 2461, unless otherwise noted.

2. Section 1.907 is amended by revising the definition of “Covered Geographic Licenses” to read 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 of this chapter); 218-219 MHz Service (part 95, subpart F, of this chapter); 220-222 MHz Service, excluding public safety licenses (part 90, subpart T, of this chapter); 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); 900 MHz Broadband Service (part 27, subpart P); Advanced Wireless Services (part 27, subparts K and L); Air-Ground Radiotelephone Service (Commercial Aviation) (part 22, subpart G, of this chapter); Broadband Personal Communications Service (part 24, subpart E, of this chapter); Broadband Radio Service (part 27, subpart M); Cellular Radiotelephone Service (part 22, subpart H); Citizens Broadband Radio Service (part 96, subpart C, of this chapter); 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, of this chapter); Upper Microwave Flexible Use Service (part 30 of this chapter); and Wireless Communications Service (part 27, subpart D of this chapter).

* * * * *

3. Section 1.9005 is amended by adding a new paragraph (nn) to read as follows:

§ 1.9005 Included services.

* * * * *

(nn) The 900 MHz Broadband Service (part 27 of this chapter).

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

4. The authority citation for part 2 continues to read as follows:

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

5. Section 2.106 is amended by revising pages 31 and 32 to read as follows:

2.106 Table of Frequency Allocations.

Federal Communications Commission

FCC XX-XXX

Table of Frequency Allocations

894-1400 MHz (UHF)

Page 31

International Table			United States Table		FCC Rule Part(s)
Region 1 Table	Region 2 Table	Region 3 Table	Federal Table	Non-Federal Table	
890-942 FIXED MOBILE except aeronautical mobile 5.317A BROADCASTING 5.322 Radiolocation	890-902 FIXED MOBILE except aeronautical mobile 5.317A Radiolocation	890-942 FIXED MOBILE 5.317A BROADCASTING Radiolocation	890-902	(See previous page)	
				894-896 AERONAUTICAL MOBILE US116 US268	Public Mobile (22)
				896-897.5 FIXED LAND MOBILE US116 US268	Private Land Mobile (90)
				897.5-900.5 FIXED MOBILE except aeronautical mobile US116 US268	Wireless Communications (27) Private Land Mobile (90)
				900.5-901 FIXED LAND MOBILE US116 US268	Private Land Mobile (90)
				901-902 FIXED MOBILE US116 US268	Personal Communications (24)
	5.318 5.325		US116 US268 G2		
	902-928 FIXED Amateur Mobile except aeronautical mobile 5.325A Radiolocation		902-928 RADIOLOCATION G59	902-928	RF Devices (15) ISM Equipment (18) Private Land Mobile (90) Amateur Radio (97)
	5.150 5.325 5.326		5.150 US218 US267 US275 G11	5.150 US218 US267 US275	
	928-942 FIXED MOBILE except aeronautical mobile 5.317A Radiolocation		928-932	928-929 FIXED US116 US268 NG35	Public Mobile (22) Private Land Mobile (90) Fixed Microwave (101)
				929-930 FIXED LAND MOBILE US116 US268	Private Land Mobile (90)
				930-931 FIXED MOBILE US116 US268	Personal Communications (24)
				931-932 FIXED LAND MOBILE US116 US268	Public Mobile (22)
			US116 US268 G2		
			932-935 FIXED US268 G2	932-935 FIXED US268 NG35	Public Mobile (22) Fixed Microwave (101)
			935-941	935-936.5 FIXED LAND MOBILE US116 US268	Private Land Mobile (90)
				936.5-939.5 FIXED	Wireless Communications (27)

Federal Communications Commission

FCC XX-XXX

				MOBILE except aeronautical mobile US116 US268	Private Land Mobile (90)
				939.5-940 FIXED LAND MOBILE US116 US268	Private Land Mobile (90)
				940-941 FIXED MOBILE US116 US268	Personal Communications (24)
5.323	5.325	5.327	US116 US268 G2	US116 US268	
942-960 FIXED MOBILE except aeronautical mobile 5.317A BROADCASTING 5.322	942-960 FIXED MOBILE 5.317A	942-960 FIXED MOBILE 5.317A BROADCASTING	941-944 FIXED US84 US268 US301 G2	941-944 FIXED US84 US268 US301 NG30 NG35	Public Mobile (22) Aural Broadcast Auxiliary (74E) Low Power Auxiliary (74H) Fixed Microwave (101)
5.323		5.320	944-960	944-960 FIXED NG35	
960-1164 AERONAUTICAL MOBILE (R) 5.327A AERONAUTICAL RADIONAVIGATION 5.328 5.328AA			960-1164 AERONAUTICAL MOBILE (R) 5.327A AERONAUTICAL RADIONAVIGATION 5.328 US224		Aviation (87)
1164-1215 AERONAUTICAL RADIONAVIGATION 5.328 RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.328B 5.328A			1164-1215 AERONAUTICAL RADIONAVIGATION 5.328 RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.328A US224		
1215-1240 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.328B 5.329 5.329A SPACE RESEARCH (active) 5.330 5.331 5.332			1215-1240 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION G56 RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) G132 SPACE RESEARCH (active) 5.332	1215-1240 Earth exploration-satellite (active) Space research (active)	
1240-1300 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.328B 5.329 5.329A SPACE RESEARCH (active) Amateur 5.282 5.330 5.331 5.332 5.335 5.335A			1240-1300 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION G56 SPACE RESEARCH (active) AERONAUTICAL RADIONAVIGATION 5.332 5.335	1240-1300 AERONAUTICAL RADIONAVIGATION Amateur Earth exploration-satellite (active) Space research (active) 5.282	Amateur Radio (97)
1300-1350 RADIOLOCATION AERONAUTICAL RADIONAVIGATION 5.337 RADIONAVIGATION-SATELLITE (Earth-to-space) 5.149 5.337A			1300-1350 AERONAUTICAL RADIONAVIGATION 5.337 Radiolocation G2 US342	1300-1350 AERONAUTICAL RADIONAVIGATION 5.337 US342	Aviation (87)
1350-1400 FIXED MOBILE RADIOLOCATION	1350-1400 RADIOLOCATION 5.338A		1350-1390 FIXED MOBILE RADIOLOCATION G2 5.334 5.339 US342 US385 G27 G114	1350-1390 5.334 5.339 US342 US385	

Federal Communications Commission

FCC XX-XXX

5.149 5.338 5.338A 5.339	5.149 5.334 5.339	1390-1395 5.339 US79 US342 US385	1390-1395 FIXED MOBILE except aeronautical mobile 5.339 US79 US342 US385 NG338A	Wireless Communications (27)
		1395-1400 LAND MOBILE (medical telemetry and medical telecommand) 5.339 US79 US342 US385		Personal Radio (95)
				Page 32

PART 20 – COMMERCIAL MOBILE SERVICES

6. The authority citation for part 20 continues to read as follows:

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.

7. Section 20.12 is amended by revising 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 900 MHz Broadband Service (included in part 27, subpart P 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 27 – MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES

8. The authority citation for part 27 continues to read as follows:

Authority: 47 U.S.C. 154, 301, 302a, 303, 307, 309, 332, 336, 337, 1403, 1404, 1451, and 1452, unless otherwise noted.

9. Section 27.1 is amended by adding paragraph (b)(15) to read as follows:

§ 27.1 Basis and purpose.

* * * * *

(b) * * *

(15) 897.5-900.5 MHz and 936.5-939.5 MHz.

10. Section 27.5 is amended by adding paragraph (n) to read as follows:

§ 27.5 Frequencies.

* * * * *

(n) *900 MHz Broadband*. The paired 897.5-900.5 MHz and 936.5-939.5 MHz bands are available for assignment on a geographic basis. For operations in the 897.5-900.5 MHz and 936.5-939.5 MHz bands (designated as Channels 120-360 in section 90.613 of this chapter), no new applications will be accepted in transitioned markets for narrowband systems under part 90, subpart S of this chapter.

* * * * *

11. Section 27.12 is amended by revising paragraph (a) to read as follows:

§ 27.12 Eligibility.

(a) Except as provided in paragraph (b) and in §§ 27.604, 27.1201, 27.1202, and 27.1503, any entity other than those precluded by section 310 of the Communications Act of 1934, as amended, 47 U.S.C. 310, is eligible to hold a license under this part.

12. Section 27.13 is amended by adding paragraph (n) to read as follows:

§ 27.13 License Period.

* * * * *

(n) *900 MHz Broadband*. Authorizations for broadband licenses in the 897.5-900.5 MHz and 936.5-939.5 MHz bands will have a term not to exceed 15 years from the date of initial issuance and ten (10) years from the date of any subsequent renewal.

* * * * *

13. Part 27 is amended by adding a new subpart P to read as follows:

Subpart P—Regulations Governing Licensing and Use of 900 MHz Broadband Service in the 897.5-900.5 MHz and 936.5-939.5 MHz Bands

27.1500 Scope

27.1501 Definitions

27.1502 Licensing of the 897.5-900.5/936.5-939.5 MHz band

27.1503 Broadband license eligibility and application requirements

27.1504 Mandatory relocation

27.1505 Performance requirements

27.1506 Frequencies

27.1507 Effective radiated power limits for 900 MHz Broadband systems

27.1508 Field strength limit

27.1509 Emission limits

27.1510 Unacceptable interference to narrowband 900 MHz licensees from 900 MHz broadband licensees

§ 27.1500 Scope.

This subpart sets out the regulations governing the licensing and operations of 900 MHz broadband systems operating in the 897.5-900.5/936.5-939.5 MHz band. It includes eligibility requirements and operational and technical standards for stations licensed in this band. 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 this frequency band.

§ 27.1501 Definitions.

Terms used in this subpart shall have the following meanings:

(a) *900 MHz Broadband*. The 900 MHz broadband systems in the 897.5-900.5/936.5-939.5 MHz band licensed by the Commission pursuant to the provisions of this subpart.

(b) *900 MHz Broadband licensee*. An entity that holds a 900 MHz broadband license issued pursuant to this subpart.

(c) *900 MHz Broadband segment*. The segment of realigned 900 MHz spectrum (i.e., the 897.5-900.5/936.5-939.5 MHz band) licensed by the Commission pursuant to the provisions of this subpart.

(d) *900 MHz Narrowband segment*. The segments of realigned 900 MHz spectrum (i.e., the 896-897.5/935-936.5 MHz and 900.5-901/939.5-940 MHz bands (Paired channels 1-119 and 361-399)) designated for narrowband operations and licensed pursuant to 47 CFR part 90, subpart S of this chapter.

(e) *Complex system*. A covered incumbent's system that consists of 45 or more functionally integrated sites.

(f) *County*. For purposes of this part, counties shall be defined using the United States Census Bureau's data reflecting county legal boundaries and names valid through January 1, 2017.

(g) *Covered incumbent*. Any 900 MHz site-based licensee in the broadband segment that is required under section 90.621(b) to be protected by a broadband licensee with a base station at any location within the county, or any 900 MHz geographic-based SMR licensee in the broadband segment that has a site in the county or within 70 miles of the county boundary.

(h) *Eligibility Certification*. A filing made to the Commission as part of the prospective broadband licensee's application for a 900 MHz broadband license that demonstrates satisfaction of the eligibility restrictions.

(i) *License Area*. The geographic component of a 900 MHz broadband license. A license area consists of one county.

(j) *Power spectral density (PSD)*. The power of an emission in the frequency domain, such as in terms of ERP or EIRP, stated per unit bandwidth, e.g., watts/MHz.

(k) *Site-channel*. A channel licensed at a particular location.

(l) *Transition Plan*. A filing made to the Commission as part of the prospective broadband licensee's application for a 900 MHz broadband license that includes a plan for transitioning the band in the particular county.

(m) *Transitioned Market*. See section 90.7 of part 90 of this chapter

§ 27.1502 Permanent discontinuance of 900 MHz broadband licenses.

A 900 MHz broadband licensee that permanently discontinues service as defined in § 1.953 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 chapter, even if a licensee fails to file the required form requesting license cancellation.

§ 27.1503 Broadband license eligibility and application requirements.

(a) *Eligibility.* For an applicant to be eligible for a broadband license in a county, it must:

(1) Hold the licenses for more than 50% of the total amount of licensed 900 MHz SMR (site-based or geographically licensed) and B/ILT (site-based) spectrum for the relevant county including credit for spectrum included in an application to acquire or relocate covered incumbents filed with the Commission on or after March 14, 2019;

(2) Hold spectrum in the broadband segment or reach an agreement to clear through acquisition or relocation, or demonstrate how it will provide interference protection to, covered incumbent licensees collectively holding licenses in the broadband segment for at least 90% of the site-channels in the county and within 70 miles of the county boundary. To provide interference protection, an applicant may:

(i) protect site-based covered incumbent(s) through compliance with minimum spacing criteria set forth in § 90.621(b) of this chapter;

(ii) protect site-based covered incumbent(s) through new or existing letters of concurrence agreeing to lesser base station separations as set forth in § 90.621(b); and/or

(iii) protect geographically based covered incumbent(s) through a private contractual agreement.

(3) If any site of a complex system is located within the county and/or within 70 miles of the county boundary, an applicant must either hold the license for that site or reach an agreement to acquire, relocate, or protect it in order to demonstrate eligibility.

(4) The applicant may use its current 900 MHz holdings in the narrowband segment to relocate covered incumbents. Spectrum used for the purpose of relocating incumbent(s) may not exceed the incumbent's current spectrum holdings in the relevant county, unless additional channels are necessary to achieve equivalent coverage and/or capacity.

(b) *Application.*

(1) Applications must be filed in accordance with part 1, subpart F of this chapter.

(2) An applicant for a 900 MHz broadband license must submit with its application an Eligibility Certification that:

(i) Lists the licenses the applicant holds in the 900 MHz band to demonstrate that it holds the licenses for more than 50% of the total licensed 900 MHz spectrum, whether SMR or B/ILT, for the relevant county including credit for spectrum included in an application to acquire or relocate any covered incumbents filed on or after March 14, 2019;

(ii) A statement that it has filed a Transition Plan detailing how it holds spectrum in the

broadband segment and/or has reached an agreement to clear through acquisition or relocation, or demonstrate how it will provide interference protection to, covered incumbent licensees collectively holding licenses in the broadband segment for at least 90% of the site-channels in the county, and within 70 miles of the county boundary.

(3) An applicant for a 900 MHz broadband license must submit with its application a Transition Plan that provides:

(i) A showing of one or more of the following:

(A) Agreement by covered incumbents to relocate from the broadband segment;

(B) Protection of site-based covered incumbents through compliance with minimum spacing criteria;

(C) Protection of site-based covered incumbents through new or existing letters of concurrence agreeing to lesser base station separations;

(D) Protection of geographically-based covered incumbents through private contractual agreements; and/or

(E) Evidence that it holds licenses for the site-channels.

(ii) Descriptions of the agreements between the prospective broadband licensee and all covered incumbents collectively holding licenses for at least 90% of site-channels within the county and within 70 miles of the county.

(iii) Descriptions in detail of all information and actions necessary to accomplish the realignment, as follows:

(A) The applications that the parties to the agreements will file for spectrum in the narrowband segment in order to relocate or repack licensees;

(B) A description of how the applicant will provide interference protection to, and/or acquire or relocate from the broadband segment covered incumbents collectively holding licenses for at least 90% of site-channels within 70 miles of the county and within 70 miles of the county and/or evidence that it holds licenses for the site-channels;

(C) Any rule waivers or other actions necessary to implement an agreement with a covered incumbent; and

(D) Such additional information as may be required.

(iv) A certification from an FCC-certified frequency coordinator that the Transition Plan's representations can be implemented consistent with Commission rules. The certification must establish that the relocations proposed therein take into consideration all relevant covered incumbents and are consistent with the existing Part 90 interference protection criteria if the covered incumbent is site-based, and include any private contractual agreements between the prospective broadband licensee and a geographically-licensed covered incumbent.

(4) Applicants seeking to transition multiple counties may simultaneously file a single Transition Plan with each of its county-based applications.

(c) *Anti-Windfall Provisions.*

(1) The applicant must return to the Commission all of its licensed 900 MHz SMR and B/ILT spectrum, up to six megahertz, for the county in which it seeks a broadband license. The applicant will be required to file, within 15 days of filing its broadband license application, an application(s) to cancel all of its 900 MHz SMR and B/ILT spectrum, up to six megahertz, conditioned upon Commission grant of its application.

(2) If the applicant relinquishes less than six megahertz of spectrum in accordance with 27.1503(c)(1), then the applicant must remit an anti-windfall payment prior to the grant of the 900 MHz broadband license. Payment must be made through a monetary payment to the U.S. Treasury.

§ 27.1504 Mandatory relocation.

(a) Subject to paragraph (b) of this section, broadband licensees may require mandatory relocation from the broadband segment, in a given county and within 70 miles of the county boundary, covered incumbents' remaining site-channels that were not covered by 27.1503(a)(2).

(b) Complex systems are exempt from mandatory relocation. To qualify as exempt from mandatory relocation, a complex system must have at least one site (of its 45 or more functionally integrated sites) located within the county license area or within 70 miles of the county boundary.

(c) *Relocation Costs and Comparable facilities.* A broadband licensee seeking to relocate a covered incumbent pursuant to this section is required to pay all reasonable relocation costs, including providing the relocated covered incumbent with comparable facilities. To be comparable, the replacement system provided to a covered incumbent during a mandatory relocation must be at least equivalent to the existing 900 MHz system with respect to the following four factors: (1) system; (2) capacity; (3) quality of service; and (4) operating costs.

(d) Having met the 90% success threshold, a 900 MHz broadband licensee seeking to trigger the mandatory relocation process shall serve notice on applicable covered incumbent(s).

(e) Following the service of notice, a 900 MHz broadband licensee may request information from the covered incumbent reasonably required to craft its offer of comparable facilities.

(f) We expect all parties to negotiate with the utmost "good faith" in the negotiation process. Factors relevant to a "good-faith" determination include:

(1) Whether the party responsible for paying the cost of band reconfiguration has made a *bona fide* offer to relocate the incumbent to comparable facilities;

(2) The steps the parties have taken to determine the actual cost of relocation to comparable facilities; and

(3) Whether either party has unreasonably withheld information, essential to the accurate estimation of relocation costs and procedures, requested by the other party.

(g) A party seeking Commission resolution of a dispute must submit in writing to the Chief, Wireless Telecommunications Bureau:

(1) the name, address, telephone number, and email address of the 900 MHz broadband licensee

or covered incumbent making the allegation;

(2) the name of the 900 MHz broadband licensee or covered incumbent about which the allegation is made;

(3) a complete statement of the facts supporting the broadband licensee's or incumbent's claim; and

(4) the specific relief sought.

(h) If an incumbent fails to negotiate in good faith, its facilities may be mandatorily relocated, and its license modified accordingly by the Commission pursuant to Section 316 of the Act. If the Wireless Telecommunications Bureau finds bad faith on the part of the broadband licensee, the broadband licensee may lose the right to relocate the incumbent or the Wireless Telecommunications Bureau may refer the matter to the Enforcement Bureau for action (which could include a range of sanctions, such as imposition of forfeitures).

§ 27.1505 Performance requirements.

(a) 900 MHz broadband licensees shall demonstrate compliance with performance requirements by filing a construction notification with the Commission, within 15 days of the expiration of the applicable benchmark, in accordance with the provisions set forth in §1.946(d) of this chapter.

(1) The licensee must certify whether it has met the applicable performance requirements. The licensee must file a description and certification of the areas for which it is providing service. The construction notifications must include electronic coverage maps and supporting technical documentation regarding the type of service it is providing for each licensed area within its service territory and the type of technology used to provide such service, and certify the accuracy of such documentation. Supporting documentation must include the assumptions used to create the coverage maps, including the propagation model and the signal strength necessary to provide reliable service with the licensee's technology.

(2) To demonstrate compliance with the population coverage requirement, licensees shall use the most recently available decennial U.S. Census Bureau data at the time of measurement and shall base their measurements of population served on areas no larger than the Census Tract level. The population within a specific Census Tract (or other acceptable identifier) will be deemed served by the licensee only if it provides reliable signal coverage to and offers service within the specific Census Tract (or other acceptable identifier). To the extent the Census Tract (or other acceptable identifier) extends beyond the boundaries of a license area, a licensee with authorizations for such areas may include only the population within the Census Tract (or other acceptable identifier) towards meeting the performance requirement of a single, individual license.

(b) A 900 MHz broadband licensee must meet either a population coverage requirement or geographic coverage as follows:

(1) *Population Metric.*

(i) A 900 MHz broadband licensee shall provide reliable signal coverage and offer broadband service to at least 45% of the population in its license area within six years of license grant.

(ii) A 900 MHz broadband licensee shall provide reliable signal coverage and offer broadband service to at least 80% of the population in its license area within 12 years of license grant.

(2) *Geographic Coverage.* Alternatively, a 900 MHz broadband licensee may:

(i) Demonstrate it provides reliable signal coverage and offers broadband service covering at least 25% of the geographic license area within six years of license grant.

(ii) Demonstrate it provides reliable signal coverage and offers broadband service covering at least 50% of the geographic license area within twelve years of license grant.

(c) Penalties.

(i) If a 900 MHz broadband licensee fails to meet the first performance benchmark, we require the licensee to meet the final performance benchmark two years sooner (i.e., at 10 years into the license term) and reduce the license term from 15 years to 13 years.

(ii) If a 900 MHz broadband licensee fails to meet the final performance benchmark, its authorization for that license area will terminate automatically without Commission action.

(d) *License Renewal.* After satisfying the 12-year, final performance benchmark, a licensee must continue to provide coverage and offer broadband service at or above that level for the remaining three years of the 15-year license term in order to warrant license renewal.

§ 27.1506 Frequencies.

896-901 MHz and 935-940 MHz bands. The 897.5-900.5 MHz and 936.5-939.5 MHz band segments are available for licensing with an authorized bandwidth up to 3 megahertz paired channels. The 897.5-900.5 MHz segment must only be used for uplink transmissions. The 936.5-939.5 MHz segments must only be used for downlink transmissions.

§ 27.1507 Effective radiated power limits for 900 MHz Broadband systems.

(a) Maximum ERP. The power limits specified in this section are applicable to operations in areas more than 110 km (68.4 miles) from the U.S./Mexico border and 140 km (87 miles) from the U.S./Canada border.

(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 304 m height above average terrain (HAAT), except that antenna heights greater than 304 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) 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 power spectral density (PSD) per sector and an antenna height of 304 m height above average terrain (HAAT), except that antenna heights greater than 304 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 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 power spectral density (PSD) per sector and an antenna height of 304 m height above average terrain (HAAT), except

that antenna heights greater than 304 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) Provided that they also comply with paragraphs (b) and (c) of this section, base and repeater stations may operate with up to a maximum ERP of 2000 watts/megahertz power spectral density (PSD) per sector and an antenna height of 304 m height above average terrain (HAAT), except that antenna heights greater than 304 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 900 MHz broadband 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 PFD of 3000 microwatts/m²/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.

(c) Power measurement. Measurement of 900 MHz broadband 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 304 meters.

Table 1 – Permissible Power and Antenna Heights for Base Stations and Repeaters 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 and Repeaters 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 and Repeaters 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 and Repeaters 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

§ 27.1508 Field strength limit.

The predicted or measured median field strength must not exceed 40 dB μ V/m at any given point along the geographic license boundary, 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.

§ 27.1509 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 900 MHz broadband operations in 897.5-900.5 MHz band by at least $43 + 10 \log (P)$ dB.
- (b) For 900 MHz broadband operations in the 936.5-939.5 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.

(e) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

§ 27.1510 Unacceptable interference to narrowband 900 MHz licensees from 900 MHz broadband licensees.

See Section 90.672 of this chapter.

PART 90 – PRIVATE LAND MOBILE RADIO SERVICES

14. The authority citation for part 90 continues to read as follows:

Authority: 47 U.S.C. 154(i), 161, 303(g), 303(r), 332(c)(7), 1401-1473.

15. Section 90.7 is amended by adding definitions for “900 MHz Broadband,” “900 MHz Broadband licensee,” “900 MHz Broadband segment,” “900 MHz Narrowband segment,” and “Transitioned Market” in alphabetical order to read as follows:

§ 90.7 Definitions.

* * * * *

900 MHz Broadband. See section 27.1501 of part 27 of this chapter.

900 MHz Broadband licensee. See section 27.1501 of part 27 of this chapter.

900 MHz Broadband segment. See section 27.1501 of part 27 of this chapter.

900 MHz Narrowband segment. See section 27.1501 of part 27 of this chapter.

Transitioned Market. A geographic area in which the 900 MHz band has been reconfigured to consist of a 900 MHz broadband license in the 900 MHz broadband segment and two 900 MHz narrowband segments pursuant to Part 27 of this chapter.

* * * * *

16. Section 90.35 is amended by revising paragraph (c)(71) to read as follows:

§ 90.35 Industrial/Business Pool.

(c) * * *

(71) Subpart S of this part contains rules for assignment of frequencies in the 806-824/851-869 MHz band and for narrowband operations in the 896-901/935-940 MHz band.

* * * * *

17. Section 90.205 is amended by revising paragraph (k) to read as follows:

§ 90.205 Power and antenna height limits.

* * * * *

(k) *806-824 MHz, 851-869 MHz, 896-901 MHz, and 935-940 MHz.* Power and height limitations for frequencies in the 806-824 MHz and 851-869 MHz bands and for narrowband operations in the 896-901/935-940 MHz band are specified in § 90.635.

* * * * *

18. Section 90.209 is amended by adding a new footnote 7 to the table in paragraph (b)(5) to read as follows:

§ 90.209 Bandwidth limitations.

* * * * *

(b) * * *

(5) * * *

Standard Channel Spacing/Bandwidth

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

* * * * *

⁷ 900 MHz broadband systems may operate on channels and with bandwidths pursuant to the rules specified in subpart P of part 27 of this chapter.

* * * * *

19. Section 90.210 is amended by adding a new footnote 7 to the table in the introductory text to read 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

***	***	***
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⁷ Equipment used with 900 MHz broadband systems operating under subpart P of part 27 of this chapter is subject to the emission limitations in § 27.1509 of this chapter.

20. Section 90.213 is amended by adding a new footnote 15 to the table in paragraph (a) to read 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 900 MHz broadband systems operating under subpart P of part 27 of this chapter 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.

21. Section 90.601 is amended to read 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 the narrowband operations 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.

22. Section 90.603 is amended by revising the introductory text to read as follows:

Except as specified in section 90.616, the following persons are eligible for licensing in the 806-824 MHz, 851-869 MHz, 896-901 MHz, and 935-940 MHz Bands.

23. Section 90.613 is amended by revising the introductory text to read as follows:

§ 90.613 Frequencies available.

The following table indicates the channel designations of frequencies available for assignment to eligible applicants under this subpart. 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, or with mobile and control station 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. For operations in the 897.5-900.5 MHz and 936.5-939.5 MHz bands (Channels 120-360), no new applications will be accepted in a transitioned market for a narrowband system under part 90, subpart S of this chapter. Only the base station transmitting frequency of each pair is listed in the following table.

24. Part 90 is amended by adding a new section to read as follows:

§ 90.616 896-897.5/935-936.5 MHz and 900.5-901/939.5-940 MHz Narrowband Segments.

(a) In a transitioned market, the narrowband segments of realigned 900 MHz spectrum (i.e., the 896-897.5/935-936.5 MHz and 900.5-901/939.5-940 MHz bands (Paired channels 1-119 and 361-399 as specified in 90.613)) are designated for the following entities:

- (1) Applicants eligible in the Industrial/Business Pool of subpart C of this part;
- (2) Business/Industrial/Land Transportation Pool and Specialized Mobile Radio licensees authorized as of September 13, 2018 for continuing operations; and
- (3) Business/Industrial/Land Transportation Pool and Specialized Mobile Radio licensees authorized as of September 13, 2018, for relocation to the new narrowband segments from the broadband segment pursuant to Part 27, subpart P, of this chapter.

(b) Applications for new authorizations will only be accepted from applicants specified in paragraph (a)(1) of this section.

(c) Table 1 indicates the channels available in transitioned markets to the entities set forth in paragraph (a) of this section. These frequencies are available in transitioned markets in non-border areas and the U.S./Mexico border area. For multi-channel systems, channels may be grouped vertically or horizontally as they appear in the following table.

TABLE 1 –CHANNELS IN THE 896-897.5/935-936.5 MHz AND 900.5-901/939.5-940 MHz FREQUENCY BANDS IN TRANSITIONED MARKETS (IN NON-BORDER AREAS AND IN THE UNITED STATES/MEXICO BORDER AREA)

1-2-3-4-5	81-82-83-84-85
6-7-8-9-10	86-87-88-89-90
11-12-13-14-15	91-92-93-94-95
16-17-18-19-20	96-97-98-99-100
21-22-23-24-25	101-102-103-104-105

26-27-28-29-30	106-107-108-109-110
31-32-33-34-35	111-112-113-114-115
36-37-38-39-40	116-117-118-119
41-42-43-44-45	361-362-363-364-365
46-47-48-49-50	366-367-368-369-370
51-52-53-54-55	371-372-373-374-375
56-57-58-59-60	376-377-378-379-380
61-62-63-64-65	381-382-383-384-385
66-67-68-69-70	386-387-388-389-390
71-72-73-74-75	391-392-393-394-395
76-77-78-79-80	396-397-398-399

(d) Table 2 indicates the channels available in transitioned markets to the entities set forth in paragraph (a) of this section, available for use in the U.S./Canada border area.

TABLE 2 – CHANNELS IN THE 896-897.5/935-936.5 AND 900.5-901/939.5-940 MHz FREQUENCY BANDS IN TRANSITIONED MARKETS AVAILABLE IN THE U.S./CANADA BORDER AREA

Region	Location (longitude)	Channels
1	66° W-71° W. (0-100 km from border)	1-119, 398, 399
2	71° W-80°30' W (0-100 km from border)	1-119
3	80°30' W-85° W (0-100 km from border)	1-119
4	85° W-121°30' W (0-100 km from border)	1-119, 398, 399
5	121°30' W-127° W (0-140 km from border)	1-119, 398, 399
6	127° W-143° W (0-100 km from border)	1-119, 398, 399
7	66° W-121°30' W (100-140 km from border)	1-119, 361-399
8	127° W-143° W (100-140 km from border)	1-119, 361-399

(e) Table 3 indicates additional channels available in transitioned markets to the entities set forth in paragraph (a) of this section, available for use in the U.S./Canada border area. The channels listed in Table 3 are available for assignment in Regions 1-6 if the maximum power flux density (PFD) of the station's transmitted signal does not exceed the limits specified in tables 29 and 30 of section 90.619 of this chapter.

TABLE 3 – ADDITIONAL CHANNELS AVAILABLE IN TRANSITIONED MARKETS IN THE U.S./CANADA BORDER AREA [REGIONS 1-6]

Region	Channel No.'s	Effective radiated power
1	361-397	See Table 29 of section 90.619
2	361-399	See Table 29 of section 90.619
3	361-399	See Table 29 of section 90.619
4	361-397	See Table 29 of section 90.619
5	361-397	See Table 30 of section 90.619
6	361-397	See Table 29 of section 90.619

25. Section 90.617 is amended by revising the introductory text of paragraphs (c) and (f), as follows:

(c) Except as specified in section 90.616, the channels listed in Table 3 are available to applicants eligible in the Industrial Business Pool of subpart C of this part but exclude Specialized Mobile 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).

* * *

(f) Except as specified in section 90.616, the channels listed in Table 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.

26. Section 90.619 is amended by revising the introductory text of paragraphs (b)(1), (b)(2), (d)(1), (d)(3), (d)(4), (d)(5), and (d)(6), and revising paragraph (d)(1) to read as follows:

(b)(1) Except as specified in section 90.616, the channels listed in Table 1 below are available to applicants eligible in the Industrial/Business Pool of subpart C of this part but exclude Specialized Mobile Radio Systems as defined in §90.603(c). These frequencies are available within the Mexico border region. Specialized Mobile Radio (SMR) systems will not be authorized on these frequencies.

* * *

(b)(2) Except as specified in section 90.616, the channels listed in Table 2 of this section 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 the Mexico border region. The spectrum blocks listed in the table below are available for EA-based services according to §90.681.

* * *

(d)

* * *

(1) Except as specified in section 90.616, channels 1-399, as listed in §90.613 table of 896-901/935-940 MHz Channel Designations, are available to eligible applicants for use in the U.S./Canada border area as shown in table 27.

* * *

(3) In Region 5, except as specified in section 90.616, channels 201-397 may be authorized in the United States under the following conditions:

* * *

(4) Except as specified in section 90.616, channel assignments for stations to be located in 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, will be only for channels 121 through 160, inclusive, and will be limited to assignments with 11 kHz or less necessary bandwidth. Coordination with Canada will be required for these channels.

(5) Except as specified in section 90.616, channel assignments for stations to be located in 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, will be only for channels 121 through 230, inclusive, and will be limited to assignments with 11 kHz or less necessary bandwidth. Coordination with Canada will be required for these channels. U.S. stations must protect Canadian stations operating on channels 121 through 230 within an area of 30 km radius from the center city coordinates (referenced to North American Datum 1983 (NAD83)) of London, Ontario (42°59'00.1" N, 81°13'59.5" W).

(6) Additional channels available— Except as specified in section 90.616, the channels listed in table 28 are available for assignment in Regions 1-6 if the maximum power flux density (PFD) of the station's transmitted signal does not exceed the limits specified in tables 29 and 30. The spreading loss shall be calculated using the free space formula taking into account any antenna discrimination in the direction of the border.

27. Section 90.672 is amended to read as follows:

§ 90.672 Unacceptable interference to non-cellular 800 MHz licensees from 800 MHz cellular systems or part 22 Cellular Radiotelephone systems, and within the 900 MHz narrowband segments, and to narrowband 900 MHz licensees from 900 MHz broadband licensees.

(a) *Definition.* Except as provided in 47 CFR 90.617(k), unacceptable interference to non-cellular licensees in the 800 MHz band from 800 MHz cellular systems or part 22 of this chapter, Cellular Radiotelephone systems; unacceptable interference within the 900 MHz narrowband segment; and unacceptable interference to narrowband 900 MHz licensees from 900 MHz broadband licensees, will be deemed to occur when the below conditions are met:

(1) A transceiver at a site at which interference is encountered:

(i) Is in good repair and operating condition, and is receiving:

(A) From the 800 MHz band, a median desired signal strength of -104 dBm or higher if operating in the 800 MHz band, or a median desired signal strength of -88 dBm if operating in the 900 MHz narrowband segment, as measured at the R.F. input of the receiver of a mobile unit; or

(B) From the 800 MHz band, a median desired signal strength of -101 dBm or higher if operating in the 800 MHz band, or a median desired signal strength of -85 dBm if operating in the 900 MHz narrowband segment; or, as measured at the R.F. input of the receiver of a portable *i.e.*, hand-held unit;

(C) From the 900 MHz broadband segment, a median desired signal strength of -104 dBm or higher if operating in the 900 MHz narrowband segment, as measured at the R.F. input of the receiver of a mobile unit; or

(D) From the 900 MHz broadband segment, median desired signal strength of -101 dBm or higher if operating in the 900 MHz narrowband segment, as measured at the R.F. input of the receiver of a

portable, *i.e.*, hand-held unit; and either

(ii) Is 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 said transceiver to be less than 20 dB if operating in the 800 MHz band, or less than 17 dB if operating in the 900 MHz narrowband segment, or;

(iii) Is 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 said transceiver to be more than the value reasonably designated by the manufacturer.

(2) Provided, however, that if the receiver section of the mobile or portable voice transceiver does not conform to the standards set out in paragraph (b) of this section, then that transceiver shall be deemed subject to unacceptable interference only at sites where the median desired signal satisfies the applicable threshold measured signal power in paragraphs (a)(1)(i) of this section after an upward adjustment to account for the difference in receiver section performance. The upward adjustment shall be equal to the increase in the desired signal required to restore the receiver section of the subject transceiver to the 20 dB $C/(I + N)$ ratio of paragraph (a)(1)(ii)(B) of this section. The adjusted threshold levels shall then define the minimum measured signal power(s) in lieu of paragraphs (a)(1)(i) of this section at which the licensee using such non-compliant transceiver is entitled to interference protection.

(b) *Minimum Receiver Requirements.* Voice transceivers capable of operating in the 806-824 MHz portion of the 800 MHz band, or in the 900 MHz narrowband segment, 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 unacceptable interference. (See paragraph (a)(2) of this section.)

(1) Voice units intended for mobile use: 75 dB intermodulation rejection ratio; 75 dB adjacent channel rejection ratio; -116 dBm reference sensitivity.

(2) Voice units intended for portable use: 70 dB intermodulation rejection ratio; 70 dB adjacent channel rejection ratio; -116 dBm reference sensitivity.

(3) Voice units intended for mobile or portable use in the 900 MHz narrowband segment: 60 dB intermodulation rejection ratio; 60 dB adjacent channel rejection ratio; -116 dBm reference sensitivity.

APPENDIX B

Final Regulatory Flexibility Analysis

1. As required by the Regulatory Flexibility Act of 1980, as amended (RFA),¹ an Initial Regulatory Flexibility Analysis (IRFA) was incorporated in the *Notice of Proposed Rulemaking (NPRM)* released in March 2019 in this proceeding.² The Commission sought written public comment on the proposals in the NPRM, including comment on the IRFA. No comments were filed addressing the IRFA. This present Final Regulatory Flexibility Analysis (FRFA) conforms to the RFA.³

A. Need for, and Objectives of, the Final Rules

2. With the *Report and Order*, the Commission adopts rules providing for the realignment of the 896/901-935/940 MHz band (900 MHz band) to create a new broadband segment and to reserve the remainder of the 900 MHz band for continued narrowband operations. More specifically, we realign the 900 MHz band to make available six of the band's ten megahertz to enable broadband by relying primarily on a negotiation-based process to transition from interleaved SMR and B/ILT blocks to site-based narrowband licenses and county-based broadband licenses, while preserving and protecting four megahertz for narrowband operations. If otherwise in the public interest, we will issue new initial licenses to prospective broadband license applicants meeting two specific eligibility requirements. With the exception of complex systems, a 900 MHz broadband licensee will be permitted to relocate mandatorily from the broadband segment, in a given county and within 70 miles of the county boundary, covered incumbents' remaining site-channels that were not covered by the broadband licensee's application—by providing comparable facilities. In addition, we create a regulatory framework for 900 MHz broadband segment licensing by establishing procedures for obtaining a license, and by adopting operational and technical rules to minimize harmful interference to narrowband operations. To further facilitate 900 MHz broadband opportunities while maintaining narrowband operations, we also issue an *Order of Proposed Modification* regarding the 900 MHz nationwide ribbon license held by the Association of American Railroads, and we announce a limited waiver of the 900 MHz application freeze to allow applications for relocation under certain conditions.

3. In assessing the rules governing alignment of the 900 MHz band, we considered—and balanced—a variety of policy objectives to determine what, if any, changes to the rules would advance the public interest. We find that this realignment, subject to the transition mechanisms we adopt today, best balances our public interest goals of expanding access to broadband wireless communications services, while maintaining access to sufficient narrowband spectrum for part 90 eligible users. This realignment will provide a variety of 900 MHz users a new opportunity to leverage broadband capacity for more robust communication networks, especially those required by industries in providing crucial services to the American public. While access to ultra-high reliability, low-latency broadband networks is crucial for many types of businesses, the record demonstrates that there is an ever-growing need by 900 MHz users, particularly utilities and other industries, for increased access to reliable broadband services. Realigning the 900 MHz band to include a new broadband segment will encourage innovation by those users. In addition, we find that the public interest is best served at this time by retaining some narrowband channels for continued operations.

¹ See 5 U.S.C. § 603. The RFA, *see* 5 U.S.C. §§ 601–612, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

² *Review of the Commission's Rules Governing the 896-901/935-940 MHz Band*, WT Docket No. 17-200, Notice of Proposed Rulemaking, 34 FCC Rcd 1550, 1595, Appx. B (2019) (900 MHz NPRM or NPRM).

³ See 5 U.S.C. § 604.

B. Summary of Significant Issues Raised by Public Comments in Response to the IRFA

4. There were no comments filed that specifically addressed the rules and policies proposed in the IRFA.

C. Response to Comments by the Chief Counsel for Advocacy of the Small Business Administration

5. Pursuant to the Small Business Jobs Act of 2010, which amended the RFA, the Commission is required to respond to any comments filed by the Chief Counsel for Advocacy of the Small Business Administration (SBA), and to provide a detailed statement of any change made to the proposed rules as a result of those comments.⁴

6. The Chief Counsel did not file any comments in response to the proposed rules in this proceeding.

D. Description and Estimate of the Number of Small Entities to Which Rules Will Apply

7. The RFA directs agencies to provide a description of, and, where feasible, an estimate of the number of small entities that may be affected by the rules adopted herein.⁵ The RFA generally defines the term “small entity” as having the same meaning as the terms “small business,” “small organization,” and “small governmental jurisdiction.”⁶ In addition, the term “small business” has the same meaning as the term “small business concern” under the Small Business Act.⁷ A “small business concern” is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the SBA.⁸

8. *Small Businesses, Small Organizations, and Small Governmental Jurisdictions.* Our action in this proceeding may, over time, affect small entities that are not easily categorized at present. We therefore describe here, at the outset, three broad groups of small entities that could be directly affected herein.⁹ First, while there are industry specific size standards for small businesses that are used in the regulatory flexibility analysis, according to data from the Small Business Administration’s (SBA) Office of Advocacy, in general, a small business is an independent business having fewer than 500 employees.¹⁰ These types of small businesses represent 99.9% of all businesses in the United States, which translates to 30.7 million businesses.¹¹

9. Next, the type of small entity described as a “small organization” is generally “any not-

⁴ *Id.* § 604(a)(3).

⁵ *Id.* § 604(a)(4).

⁶ *Id.* § 601(6).

⁷ *Id.* § 601(3) (incorporating by reference the definition of “small business concern” in the Small Business Act, 15 U.S.C. § 632). Pursuant to 5 U.S.C. § 601(3), the statutory definition of a small business applies “unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register.”

⁸ 15 U.S.C. § 632.

⁹ *See* 5 U.S.C. § 601(3)-(6).

¹⁰ *See* SBA, Office of Advocacy, *What’s New With Small Business?* (Sept. 2019) <https://cdn.advocacy.sba.gov/wp-content/uploads/2019/09/23172859/Whats-New-With-Small-Business-2019.pdf>.

¹¹ *Id.*

for-profit enterprise which is independently owned and operated and is not dominant in its field.”¹² The Internal Revenue Service (IRS) uses a revenue benchmark of \$50,000 or less to delineate its annual electronic filing requirements for small exempt organizations.¹³ Nationwide, for tax year 2018, there were approximately 571,709 small exempt organizations in the U.S. reporting revenues of \$50,000 or less according to the registration and tax data for exempt organizations available from the IRS.¹⁴

10. Finally, the small entity described as a “small governmental jurisdiction” is defined generally as “governments of cities, counties, towns, townships, villages, school districts, or special districts, with a population of less than fifty thousand.”¹⁵ U.S. Census Bureau data from the 2017 Census of Governments¹⁶ indicate that there were 90,075 local governmental jurisdictions consisting of general purpose governments and special purpose governments in the United States.¹⁷ Of this number there were 36,931 general purpose governments (county,¹⁸ municipal and town or township¹⁹) with populations of less than 50,000 and 12,040 special purpose governments - independent school districts²⁰ with enrollment

¹² 5 U.S.C. § 601(4).

¹³ The IRS benchmark is similar to the population of less than 50,000 benchmark in 5 U.S.C § 601(5) that is used to define a small governmental jurisdiction. Therefore, the IRS benchmark has been used to estimate the number small organizations in this small entity description. See Internal Revenue Service, *Annual Electronic Filing Requirement for Small Exempt Organizations — Form 990-N (e-Postcard) – Who must file* (Mar. 20, 2020), <https://www.irs.gov/charities-non-profits/annual-electronic-filing-requirement-for-small-exempt-organizations-form-990-n-e-postcard>. We note that the IRS data does not provide information on whether a small exempt organization is independently owned and operated or dominant in its field.

¹⁴ See Internal Revenue Service, *Exempt Organizations Business Master File Extract (EO BMF) - CSV Files by Region* (Mar. 9, 2020), <https://www.irs.gov/charities-non-profits/exempt-organizations-business-master-file-extract-eo-bmf>. The IRS Exempt Organization Business Master File (EO BMF) Extract provides information on all registered tax-exempt/non-profit organizations. The data used for purposes of this description was extracted from the IRS EO BMF data for Region 1-Northeast Area (76,886), Region 2-Mid-Atlantic and Great Lakes Areas (221,121), and Region 3-Gulf Coast and Pacific Coast Areas (273,702), which includes the continental U.S., Alaska, and Hawaii. This data does not include information for Puerto Rico.

¹⁵ 5 U.S.C. § 601(5).

¹⁶ See 13 U.S.C. § 161. The Census of Governments survey is conducted every five (5) years compiling data for years ending with “2” and “7”; see also U.S. Census Bureau, *Census of Governments* (Apr. 25, 2019), <https://www.census.gov/programs-surveys/cog/about.html>.

¹⁷ See U.S. Census Bureau, *2017 Census of Governments – Organization Table 2. Local Governments by Type and State: 2017 [CG1700ORG02]* (Feb. 12, 2020); <https://www.census.gov/data/tables/2017/econ/gus/2017-governments.html>. Local governmental jurisdictions are made up of general purpose governments (county, municipal and town or township) and special purpose governments (special districts and independent school districts); see also Table 2. CG1700ORG02 Table Notes_Local Governments by Type and State_2017.

¹⁸ See U.S. Census Bureau, *2017 Census of Governments - Organization, Table 5. County Governments by Population-Size Group and State: 2017 [CG1700ORG05]* (Feb. 12, 2020); <https://www.census.gov/data/tables/2017/econ/gus/2017-governments.html>. There were 2,105 county governments with populations less than 50,000. This category does not include subcounty (municipal and township) governments.

¹⁹ See U.S. Census Bureau, *2017 Census of Governments - Organization, Table 6. Subcounty General-Purpose Governments by Population-Size Group and State: 2017 [CG1700ORG06]* (Feb. 12, 2020); <https://www.census.gov/data/tables/2017/econ/gus/2017-governments.html>. There were 18,729 municipal and 16,097 town and township governments with populations less than 50,000.

²⁰ See U.S. Census Bureau, *2017 Census of Governments - Organization, Table 10. Elementary and Secondary School Systems by Enrollment-Size Group and State: 2017 [CG1700ORG10]* (Feb. 12, 2020); <https://www.census.gov/data/tables/2017/econ/gus/2017-governments.html>. There were 12,040 independent school districts with enrollment populations less than 50,000; see also U.S. Census Bureau, *Table 4. Special-Purpose Local*

(continued....)

populations of less than 50,000.²¹ Accordingly, based on the 2017 U.S. Census of Governments data, we estimate that at least 48,971 entities fall into the category of “small governmental jurisdictions.”²²

11. *Wireless Telecommunications Carriers (except Satellite)*. This industry comprises establishments engaged in operating and maintaining switching and transmission facilities to provide communications via the airwaves. Establishments in this industry have spectrum licenses and provide services using that spectrum, such as cellular services, paging services, wireless internet access, and wireless video services.²³ The appropriate size standard under SBA rules is that such a business is small if it has 1,500 or fewer employees.²⁴ For this industry, U.S. Census Bureau data for 2012 show that there were 967 firms that operated for the entire year.²⁵ Of this total, 955 firms had employment of 999 or fewer employees and 12 had employment of 1000 employees or more.²⁶ Thus under this category and the associated size standard, the Commission estimates that the majority of wireless telecommunications carriers (except satellite) are small entities.

12. *Private Land Mobile Radio Licensees – 900 MHz Band*. Private land mobile radio (PLMR) systems serve an essential role in a vast range of industrial, business, land transportation, and public safety activities. Companies of all sizes operating in all U.S. business categories use these radios. The 900 MHz band (896-901/935-940 MHz) is designated for narrowband PLMR communications by Business/Industrial/Land Transportation (B/ILT) licensees and for Specialized Mobile Radio (SMR) providers, with deployed systems primarily used for two-way communication by land transportation, utility, manufacturing, and petrochemical companies. Only B/ILT and SMR licensees are eligible to operate in the 900 MHz band. Currently, there are 420 B/ILT licensees and 42 SMR licensees who would be affected by our actions in this proceeding.

13. The SBA has not developed a small business size standard specifically applicable to PLMR – 900 MHz Band users. The closest applicable category is Wireless Telecommunications Carriers (except Satellite) which encompasses business entities engaged in *radiotelephone communications*.²⁷ The

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Governments by State Census Years 1942 to 2017 [CG1700ORG04] (Feb. 12, 2020);

<https://www.census.gov/data/tables/2017/econ/gus/2017-governments.html>.

²¹ While the special purpose governments category also includes local special district governments, the 2017 Census of Governments data does not provide data aggregated based on population size for the special purpose governments category. Therefore, only data from independent school districts is included in the special purpose governments category.

²² This total is derived from the sum of the number of general purpose governments (county, municipal and town or township) with populations of less than 50,000 (36,931) and the number of special purpose governments - independent school districts with enrollment populations of less than 50,000 (12,040), from the 2017 Census of Governments - Organizations Tables 5, 6, and 10.

²³ U.S. Census Bureau, *2017 NAICS Definitions, 517312 Wireless Telecommunications Carriers (Except Satellite)*, <https://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=517312&search=2017%20NAICS%20Search>.

²⁴ 13 CFR § 121.201, NAICS Code 517312 (previously 517210).

²⁵ U.S. Census Bureau, *2012 Economic Census of the United States, Table EC1251SSSZ5, Information: Subject Series: Estab and Firm Size: Employment Size of Firms for the U.S.: 2012 Economics Census of the United States, NAICS Code 517210*, <https://data.census.gov/cedsci/table?text=EC1251SSSZ5&n=517210&tid=ECNSIZE2012.EC1251SSSZ5&hidePreview=false&vintage=2012>.

²⁶ *Id.* Available census data do not provide a more precise estimate of the number of firms that have employment of 1,500 or fewer employees; the largest category provided is for firms with “1000 employees or more.”

²⁷ U.S. Census Bureau, *2017 NAICS Definitions, 517312 Wireless Telecommunications Carriers (Except Satellite)*, <https://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=517312&search=2017%20NAICS%20Search>.

appropriate size standard for this category under SBA rules is that such a business is small if it has 1,500 or fewer employees.²⁸ For this industry, U.S. Census Bureau data for 2012 show that there were 967 firms that operated for the entire year.²⁹ Of this total, 955 firms had employment of 999 or fewer employees and 12 had employment of 1000 employees or more.³⁰ Thus, under this category and the associated size standard, the Commission estimates that the majority of 900 MHz Band PLMR licensees are small entities.

14. The Commission has not developed a small business size standard specifically applicable to PLMR users in general, or for B/ILT licensees whose services fall under a larger category of PLMR services. We therefore rely on the SBA's size standard for Wireless Telecommunications Carriers (except Satellite) which encompasses business entities engaged in radiotelephone communications employing no more than 1,500 persons to assess the impact on B/ILT licensees.³¹ While relying on the SBA's size standard, we note that the Commission does not require PLMR licensees to disclose information about the number of employees and does not have information that could be used to determine exactly how many B/ILT licensees constitute small entities under this definition. Nevertheless, we estimate that the majority of affected B/ILT authorizations are held by small entities.

E. Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements for Small Entities

15. The *Report and Order* adopts new or additional reporting or recordkeeping and/or other compliance obligations for small entities as well as other applicants and licensees. For example, all applicants for new 900 MHz broadband licenses must file an Eligibility Certification to demonstrate satisfaction with the new eligibility restrictions and must submit a detailed Transition Plan that includes a frequency coordinator certification for transitioning a band in a particular county. Broadband licensees are also required to maintain certain data associated with performance benchmarks to demonstrate compliance with the performance requirements adopted in the *Report and Order*.

16. The adopted rule changes are likely to require small entities to hire attorneys, engineers, consultants, or other professionals in order to meet compliance obligations in the *Report and Order*. The Commission, however, cannot quantify the cost of compliance with these rule changes. We note, however, that several of the rule changes are consistent with and mirror existing policies and requirements used in similar spectrum bands. Therefore, small entities with existing licenses may already be familiar with such policies and requirements and have the processes and procedures in place to facilitate compliance resulting in minimal incremental costs to comply with the *Report and Order*. Below we discuss the compliance requirements adopted in the *Report and Order*.

17. *Application Freeze*. In order to preserve the spectral landscape while this rulemaking proceeding was pending, the Wireless Telecommunications Bureau suspended acceptance and processing of applications for new and expanded use of 900 MHz B/ILT channels.³² In an *Order* accompanying this

²⁸ See 13 CFR § 121.201, NAICS Code 517312 (previously 517210).

²⁹ U.S. Census Bureau, *2012 Economic Census of the United States, Table EC1251SSSZ5, Information: Subject Series: Estab and Firm Size: Employment Size of Firms for the U.S.: 2012 NAICS Code 517210*. <https://data.census.gov/cedsci/table?text=EC1251SSSZ5&n=517210&tid=ECNSIZE2012.EC1251SSSZ5&hidePreview=false&vintage=2012>.

³⁰ *Id.* Available census data do not provide a more precise estimate of the number of firms that have employment of 1,500 or fewer employees; the largest category provided is for firms with "1000 employees or more."

³¹ See 13 CFR § 121.201, NAICS Code 517210.

³² See *Wireless Telecommunications Bureau Announces Temporary Filing Freeze on the Acceptance of Certain Part 90 Applications for 896-901/935-940 MHz (900 MHz Band) Spectrum*, WT Docket No. 17-200, Public Notice, 33 FCC Rcd 8735 (WTB 2018).

Report and Order, the Commission lifts the freeze for the limited purpose of permitting covered incumbents to file applications to relocate their operations to different frequencies, as long as the application is part of a Transition Plan for a prospective broadband applicant or related to an agreement with a broadband license after license grant (e.g., as part of mandatory relocation). The *Order* also permits the Wireless Telecommunications Bureau to adjust the freeze, if necessary, to implement the transition as needed.

18. *Transition Mechanism.* The *Report and Order* adopts an open-ended process whereby 900 MHz band realignment can occur in a county through a negotiation-based transition involving mutual agreement between the prospective broadband licensees and covered incumbents for the incumbent's acquisition, relocation, or protection. Through this approach, prospective broadband licensees may negotiate agreements to clear the entire broadband segment of narrowband operations, as needed, on a county-by-county basis so that it may apply for the broadband license in the cleared area. Clearing an incumbent from the broadband segment may include the prospective broadband licensee negotiating for the incumbent to cancel its license. In addition, a prospective broadband licensee may apply for a broadband license without clearing an incumbent from the band through negotiation by demonstrating it can protect the incumbent. While small entities may desire the advice of legal counsel in negotiating these agreements, the Commission does not anticipate that these matters will be so complex as to require additional legal or regulatory compliance staff.

19. The Commission also finds that a more comprehensive transition to 900 MHz broadband requires implementation, under certain limited circumstances, of mandatory relocation of narrowband incumbents from the broadband segment. With the exception of complex systems, a 900 MHz broadband licensee will therefore be permitted to relocate mandatorily from the broadband segment, in a given county and within 70 miles of the county boundary, covered incumbents' remaining site-channels that were not covered by the broadband licensee's agreements to reach the 90% eligibility threshold by providing comparable facilities.

20. *Applications.* To obtain a new 900 MHz broadband segment license in a county, applicants must file an application with the Commission that includes: (1) a certification that the applicant satisfies the eligibility restrictions (Eligibility Certification), and (2) a plan for transitioning the band in the particular county (Transition Plan) that describes the private agreements between the prospective broadband licensee and all covered incumbents. The Eligibility Certification, at a minimum, must list the licenses the applicant holds in the 900 MHz band and any credit for 900 MHz spectrum used to facilitate timely relocations, to demonstrate that it holds more than 50% of the total licensed 900 MHz spectrum (whether SMR or B/ILT) for the relevant county, including credit for spectrum included in an application to acquire or relocate covered incumbents filed on or after March 14, 2019; as well as a statement that the applicant's Transition Plan that it holds spectrum in the broadband segment and/or how it has reached an agreement to clear through acquisition or relocation or to provide interference protection to covered incumbent licensees covering at least 90% of the site-channels in the broadband segment in the county and within 70 miles of the county boundary.

21. In the Transition Plan, the applicant must demonstrate one or more of the following for at least 90% of the site-channels in the county and within 70 miles of the applicable 900 MHz broadband license area, when including its license holdings in the county, as applicable: (1) agreement by covered incumbents to relocate from the broadband segment; (2) protection of site-based covered incumbents through compliance with minimum spacing criteria; (3) protection of site-based covered incumbents through new or existing letters of concurrence agreeing to lesser base station separations; (4) protection of geographically-based covered incumbents through private agreements; and/or (5) evidence that it holds licenses for the site-channels. The Transition Plan must describe in detail all information and actions necessary to accomplish the realignment, as follows: (1) the frequencies within the broadband segment that the applicant seeks from Commission inventory for its 900 MHz broadband license; (2) a description of the agreements reached with covered incumbents to relocate and the applications that the parties to the agreements will file for spectrum in the narrowband segment in order to relocate or repack licensees; (3) a

description of how the applicant will provide interference protection to, and/or acquire or relocate from the broadband segment, covered incumbents collectively holding licenses for at least 90% of site-channels in the county and within 70 miles of the county and/or evidence that it holds licenses for the site-channels; (4) any rule waivers or other actions necessary to implement an agreement with a covered incumbent; and (5) such additional information as may be required.

22. Further, the applicant must include in its Transition Plan a certification from an FCC-certified frequency coordinator that the Transition Plan's representations can be implemented consistent with Commission rules. Specifically, the frequency coordinator's certification must establish that the proposed relocations consider all relevant covered incumbents and are consistent with the existing part 90 interference protection criteria if the covered incumbent is site-based, and cover any private contractual agreements between the prospective broadband licensee and a geographically-licensed covered incumbent.

23. *Anti-Windfall Provisions.* A 900 MHz broadband license applicant must return to the Commission all of its licensed 900 MHz narrowband SMR and B/ILT spectrum, up to six megahertz, for the relevant county in which it seeks a broadband license. Whenever a broadband license applicant relinquishes less than six megahertz of spectrum in exchange for receiving a six megahertz broadband license, it must make a monetary payment to the U.S. Treasury, prior to the grant of a 900 MHz broadband license.

24. Small entities may require the expertise of engineers to analyze steps necessary to effectuate relocation to the narrowband segment, but we expect such tasks could be completed by engineering staff that already oversee their licensed operations and would not require small entities to hire additional staff. Similarly, while small entities may desire the advice of legal counsel in negotiating the Transition Plan, the Commission does not anticipate that such matters will be so complex as to require additional legal or regulatory compliance staff.

25. *Licensing and Operating Rules.* The Commission designates the 900 MHz broadband allocation as a Miscellaneous Wireless Communications Service governed by part 27 of the Commission's rules. Broadband licensees in the 900 MHz broadband segment are therefore required to comply with licensing and operating rules applicable to all part 27 services, including foreign ownership reporting,³³ renewal criteria,³⁴ permanent discontinuance of operations,³⁵ partitioning and disaggregation,³⁶ and spectrum leasing.³⁷ Like other services authorized under part 27, a 900 MHz broadband license applicant must designate its regulatory status. We also adopt service-specific rules for the 900 MHz broadband segment. We decline to regulate a 900 MHz broadband licensee under part 90 of our rules. As a result, the 900 MHz broadband licensees and the 900 MHz narrowband incumbents will be operating under two different sets of rules. Small entities, particularly those who do not currently hold licenses subject to the Commission's part 27 rules, may need to hire professionals to facilitate compliance with the licensing and operating rules applicable to part 27 services.

26. *Performance Requirements.* The *Report and Order* establishes a two-fold tailored performance requirement consisting of the following components: (1) a 900 MHz broadband licensee

³³ 47 U.S.C. § 310; 47 CFR § 1.5000 *et seq.*

³⁴ 47 CFR § 1.949. We note the Commission recently amended several of the rules applicable to various geographically-licensed wireless radio services. *See Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95, and 101 To Establish Uniform License Renewal et al.*, WT Docket No. 10-112, Second Report and Order and Further Notice of Proposed Rulemaking and Order, 32 FCC Rcd 8874 (2017) (*WRS Renewal Reform 2nd R&O and FNPRM*).

³⁵ 47 CFR § 1.953.

³⁶ *Id.* § 1.950.

³⁷ *Id.* § 1.9001 *et seq.*

must provide reliable broadband service; and (2) a 900 MHz broadband licensee must meet either (a) a population coverage requirement, or (b) a geographic coverage requirement. The 900 MHz broadband licensees are required to provide reliable broadband service to at least forty-five (45) percent of the population in its license area within six years of license grant (interim performance benchmark), and to at least eighty (80) percent of the population in each of its license areas within twelve years from the license issue date. Alternatively, a broadband license may demonstrate that it provides reliable broadband service covering at least twenty-five (25) percent of the geographic license area within six years of license grant, and that it covers fifty (50) percent of the geographic license area within twelve years of license grant.

27. Along with performance benchmarks, the *Report and Order* also adopts a penalty for failure to meet performance requirements. If a 900 MHz broadband licensee fails to meet the first performance benchmark at six years from the license issuance date, the licensee must meet the second performance benchmark two years sooner (i.e., at 10 years into the license term) and reduce the license term from 15 years to 13 years. If a 900 MHz broadband licensee fails to meet the second performance benchmark, its authorization for that license area terminates automatically without Commission action. In addition, if a broadband licensee plans to lease its spectrum on a long-term basis, they are subject to our *de facto* leasing rules. Specifically, if a 900 MHz broadband licensee relies on its lessee to meet the performance requirements adopted herein, and the lessee fails to do so, the Commission will enforce the performance requirements on the licensee.

28. The performance benchmarks apply to any small entity that obtains a new 3/3 megahertz broadband license. While the prospective broadband licensee may already have the engineering staff and expertise necessary to provide existing narrowband services in the 900 MHz band, given the requirement to provide broadband service for purposes of satisfying performance benchmarks, the new licensee may need to hire additional staff to ensure compliance with those requirements.

29. *Technical Rules.* The *Report and Order* permits an effective radiated power for base and repeater stations in the broadband segment not to exceed 400 watts/megahertz in non-rural areas and 800 watts/megahertz in rural areas, with maximum permissible power decreasing as the antenna height above average terrain (HAAT) rises above 304 meters. The *Report and Order* provides an additional requirement on broadband licensees seeking to operate at higher powers to mitigate the risk of interference. Provided the broadband licensee complies with a modeled power flux density of 3000 microwatts/m²/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, we permit 900 MHz base stations to operate with an effective radiated power not to exceed 1 kilowatt (30 dBw) in non-rural areas and 2 kilowatts in rural areas and an antenna height above average terrain (HAAT) not to exceed 304 meters (1,000 feet), with the maximum permissible power decreasing as the HAAT rises above 304 meters.³⁸

30. The *Report and Order* establishes an out-of-band emissions (OOBE) limit outside a licensee's frequency band of operation to be attenuated by at least $43 + 10 \log (P)$ dB for uplink operations in the 897.5-900.5 MHz band and by at least $50 + 10 \log (p)$ dB for downlink operations in the 936.5-939.5 MHz band. We also adopt a rule that provides authority for the Commission to impose operational restrictions or tighter OOBE limits if necessary to resolve harmful interference, which is similar to that applied in other bands.³⁹

31. Co-channel broadband systems must comply with existing 900 MHz co-channel separation requirements, which require that co-channel systems generally comply with a minimum spacing criterion of at least 113 kilometers (70 miles) separation distance between base stations. In addition, broadband licensees are required to prevent harmful interference to narrowband operations and to resolve any unacceptable interference in the shortest time practicable. Specifically, 900 MHz

³⁸ See 47 CFR § 90.635(a).

³⁹ See, e.g., *id.* §§ 27.53(n), 90.691(b).

broadband licensees are required to comply with new and revised rules defining unacceptable interference and resolution requirements, in which we deem unacceptable interference to 900 MHz narrowband licensees as occurring when the applicable median desired signal levels is measured to be -104 dBm or higher at the RF input of narrowband licensees' mobile receivers and -101 dBm or higher at the RF input of narrowband licensees' portable receivers. In addition, the *Report and Order* establishes a median field strength limit of 40 dBμV/m at any given point along the geographic license boundary in the broadband segment unless the affected licensee agrees to a higher field strength limit.

32. Any 900 MHz broadband licensees seeking to operate in the Canada/Mexico border region are subject to international agreements between Canada and Mexico. These include, as applicable, limitations on channel usage, as 900 MHz channels are divided between countries on a primary and secondary basis, and it is likely that a 900 MHz broadband license in the border area would be operating on both U.S. primary channels and channels that are secondary to Mexican and/or Canadian operations. Further, a 900 MHz broadband licensee will be subject to current power restrictions, which for primary licensees vary based on antenna height, and for secondary licensees include more restrictive power flux density limits. Future broadband licensees in the 900 MHz band also will be subject to any international agreements governing border-area operations.

F. Steps Taken to Minimize the Significant Economic Impact on Small Entities, and Significant Alternatives Considered

33. The RFA requires an agency to describe any significant alternatives, specifically small business, that it has considered in developing its approach, which may include the following four alternatives (among others): “(1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities; (3) the use of performance rather than design standards; and (4) an exemption from coverage of the rule, or any part thereof, for such small entities.”⁴⁰

34. By realigning the 900 MHz band to create a broadband segment, the *Report and Order* is designed to enable new broadband deployment that can provide enhanced spectrum capacity to meet the needs of 900 MHz entities for safe and efficient operation. This action is critical to the continuation of technological advancement, furthers the goals of the Telecommunications Act of 1996, and serves the public interest. We are likewise committed to ensuring that the disruption to incumbent operations, and the economic impact of this proceeding on both incumbent licensees and new broadband licensees, is minimal. The Commission has taken steps to enable it to minimize the economic burden on small entities that could occur if some of the rule changes or approaches proposed in the *Notice* are adopted. Specifically, we sought to identify whether small entities face any special or unique issues with respect to the proposed licensing and operating rules such that they would require certain accommodations or additional time to comply. We also sought comment on modifications that could be made to our rules regarding administrative processes that would reduce the economic impacts of proposed rule changes on small entities.

35. In realigning the 900 MHz band, we considered how our proposal impacts narrowband operations in the 900 MHz band, which includes small entities as well as other applicants and licensees. We find that increased access to broadband would serve the public interest if existing narrowband operations can be accommodated. We adopt rules that require the protection of 900 MHz band incumbents and ensure that incumbents' status quo environment will be maintained at a minimum. For example, the 900 MHz band will be transitioned only in markets where it is achievable through substantially successful negotiations; no incumbent systems will be subject to mandatory relocation unless provided with comparable facilities, and systems that meet a certain threshold number of integrated

⁴⁰ 5 U.S.C. § 603(c)(1)-(4).

sites are not even subject to mandatory relocation. In addition, the technical rules we apply to all broadband licensees maintain the 900 MHz band's current strict interference base station distance separation protections; thus, incumbents will not be subject to closer separations than provided under current rules unless agreed upon through negotiation.

36. In developing a transition process for realigning the 900 MHz band, we considered how any transition mechanism the Commission adopts must account for such variations in the intensity of spectrum use across geographic areas and provide for alternatives where necessary. We sought comment on alternatives to be used in combination with a voluntary process and considered how the transition process would impact small entities in terms of cost, resources, and time. For example, we considered alternatives for transitioning the band to broadband use, including an auction of overlay licenses and an incentive auction. After reviewing the record, we find that the public interest is best served at this time by adopting a negotiation-based transition process, resulting in eligible applicants being issued new initial licenses to clear the new broadband segment, coupled with a mechanism for mandatory relocation under certain narrow circumstances. We find that this combination leverages the speed and efficiency of a negotiation-based transition through private agreements while ensuring that we effectively expand access to broadband wireless communications services in the band. We also find that the negotiation-based transition process minimizes any adverse impact of the new rules on small entities, as the process enables incumbents, who know best what their current and future needs are, to directly negotiate the terms of any relocations with the very parties with the means and motivation to meet these needs. The process also ensures a timely and efficient transition based on the realities of operations in the relevant county, providing flexibility to stakeholders, including small entities, to make practical business decisions.

37. For the broadband licensee eligibility criteria, we considered how the proposed criteria could impact small entities. After considering concerns raised by commenters, we adopt criteria that provide broader eligibility for those seeking a broadband license. In the *NPRM*, we proposed that the broadband license applicant must hold all 20 geographically licensed SMR blocks for the relevant county, and we sought comment on alternative eligibility criteria that could meet this goal. Commenters found our proposal too restrictive, effectively barring applications from small entities and the very entities that could benefit from the broadband service. We agree and expand the eligibility criteria to permit prospective broadband licensees to qualify by holding more than 50% of the total licensed 900 MHz spectrum (whether SMR or B/ILT) in the relevant county. We find it in the public interest to adopt expanded eligibility criteria, which enables a greater number of small entities to be eligible for the broadband license. We decline to adopt proposals by certain commenters that would further restrict eligibility for a broadband license beyond our original proposal, which may adversely impact small entities by unnecessarily constraining who may participate in the process or of effectively imposing holding periods. We find the public interest is better served by the approach we adopt today, which allows any type of licensee to meet the eligibility requirements and encourages as expeditious and efficient a transition to broadband as possible.

38. We recognize that reconfiguring the 900 MHz band to provide for a transition to broadband may cause covered incumbents, including small entities, some inconvenience. We therefore adopt rules that ensure both continuity of service and that mandatorily relocated licensees receive "comparable facilities" on their new frequency assignments at the broadband licensee's expense, which could involve, for example, retuning existing radios or providing replacement equipment. We find that this requirement helps ensure covered incumbents are not unduly burdened and that their operations are not inordinately disrupted if relocated from the broadband segment.

39. To minimize the cost, resources, and time necessary for compliance, we adopt rules allowing the applicant seeking to transition multiple counties simultaneously to file a single Transition Plan with each of its county-based applications. Allowing one Transition Plan for an applicant seeking to transition multiple counties furthers the public interest by increasing administrative efficiency and reducing the burden on the applicant.

40. For licensing and operating rules, we recognize that a smaller geographic area for the broadband license—such as MSAs, counties, etc.—might better align with the interests of licensees who are small entities and operate in smaller areas. We believe that using a smaller broadband license size could provide an opportunity for small 900 MHz licensees to obtain directly a broadband license to meet their broadband needs.

41. We also find that an initial license term of 15 years for 900 MHz broadband licensees with a term of 10 years for any subsequent license renewals will promote investment in the band, which is necessary to encourage development of broadband services in the band.

Report to Congress

42. The Commission will send a copy of the *Report and Order*, including this FRFA, in a report to be sent to Congress pursuant to the Congressional Review Act.⁴¹ In addition, the Commission will send a copy of the *Report and Order*, including this FRFA, to the Chief Counsel for Advocacy of the SBA. A copy of the *Report and Order* and FRFA (or summaries thereof) will also be published in the Federal Register.⁴²

⁴¹ See 5 U.S.C. § 801(a)(1)(A).

⁴² See *id.* § 604(b).

APPENDIX C**List of Commenters**Comments

Alliant Energy
Ameren Services Company
American Petroleum Institute and the Energy Telecommunications Electrical Association
Anterix (formerly pdvWireless, Inc.)
Association of American Railroads
Azetti Networks
Burns & McDonnell
Council Rock
Critical Infrastructure Coalition
Critical Response Systems, Inc.
Duke Energy Corporation
Encore Networks, Inc.
Enterprise Wireless Alliance
Ericsson
FirstEnergy Corp.
Hawaiian Electric Company, Inc., Maui Electric Company, Ltd., Hawai'i Electric Light Company, Inc.
(Hawaiian Electric Companies)
JVCKENWOOD USA Corporation
Lockard and White, Inc.
Los Angeles Department of Water and Power
Lower Colorado River Authority
Mission Critical Partners, LLC
Motorola Solutions, Inc.
Multi-Tech Systems, Inc.
National Association of Manufacturers and MRFAC, Inc
NextEra Energy, Inc.
Oncor Electric Delivery Company LLC
Sensus USA Inc.
Sonim Technologies, Inc.
Southern California Edison
Southern Company Services, Inc.
Tait North America
United Parcel Service, Inc.
Utilities Technology Council
Virtual Network Communications Inc.

Reply Comments

Ad Hoc Refiners Group
Alliant Energy
Anterix (formerly pdvWireless, Inc.)
Association of American Railroads
Black & Veatch
Caesars Entertainment Corporation
Enterprise Wireless Alliance
General Electric Renewables

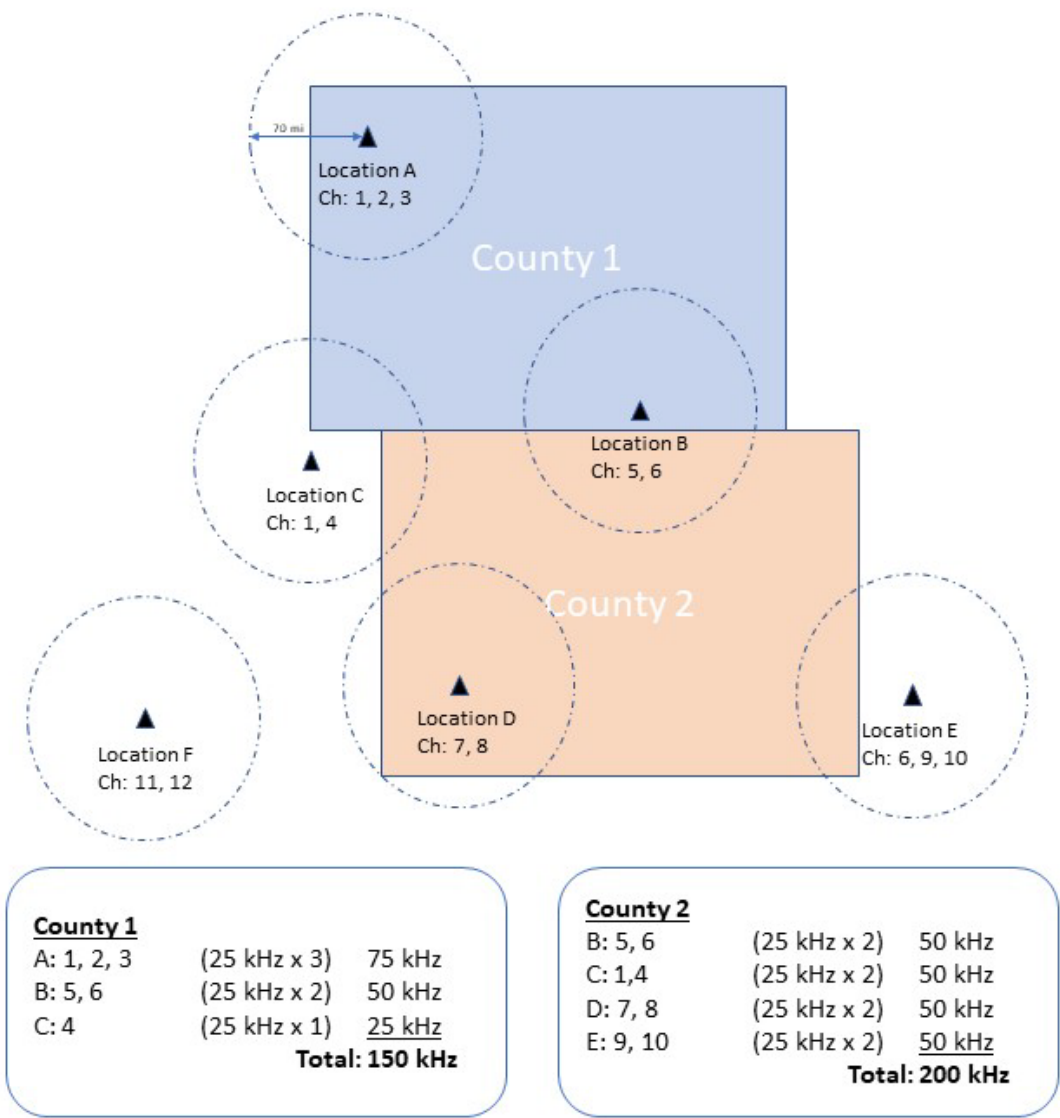
Jackson Electric Membership Corporation
Los Angeles Department of Water and Power
Lower Colorado River Authority
National Rural Electric Cooperative Association
New York Power Authority
NextEra Energy, Inc.
Southern California Edison
Southern Company Services, Inc.
Space Data Corporation
United Parcel Service, Inc.
Utilities Technology Council

Ex Parte Letters

Ad Hoc Refiners Group
Ameren Services Company
American Petroleum Institute
Anterix (formerly pdvWireless, Inc.)
Association of American Railroads
Enterprise Wireless Alliance
Eversource Energy, Inc.
Flint Hills Resources
Gogo Inc.
Lower Colorado River Authority
Michael Oldak
National Association of Manufacturers and MRFAC, Inc
NextEra Energy, Inc.
San Diego Gas & Electric
Southern California Edison
Southern Communications Services, Inc.
United Parcel Service, Inc.
Utilities Technology Council
Wireless Infrastructure Association

APPENDIX D

Spectrum Threshold Illustration



Notes

Circles represent a 20-mile radius around the site.

Site channels in and within 20 miles of a county boundary contribute to that county's total.

Channels count only once for a particular county. This is why channel 1 is included for Location A but not C in County 1 and also why channel 6 is included for Location B but not E in County 2.

Channels spanning multiple counties contribute to all counties.

APPENDIX E**License Cancellations to Facilitate AAR License Modification**

KNNX653	KNNX936	KNNX384
KNNX590	KNNX934	KNNX984
KNNX932	KNNX980	KNNX523
KNNX230	KNNX324	KNNX396
KNNX345	WQAD455	KNNX400
KNNX652	KNNX336	KNNX404
KNNX264	KNNX966	KNNY292
KNNX957	KNNY251	KNNX409
KNNX935	WQAD459	KNNX546
KNNX279	KNNX364	KNNX609
KNNX586	KNNX971	KNNX922
KNNY389	KNNY274	KNNX413
KNNX288	WQAD462	KNNX577
WQAD448	KNNY382	KNNX420
KNNX990	WQAD465	KNNY295
		KNNX991

Anterix will cancel the following additional license upon acquisition after consummation of a pending transaction:

KNNY247