

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

In the Matter of
PTC-220, LLC, Request for Modification of Rule
Waivers to Deploy Railroad Safety Systems in the
220 MHz Band
Lead ULS File No. 0009965899

MEMORANDUM OPINION AND ORDER

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By the Chief, Mobility Division, Wireless Telecommunications Bureau:

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I. INTRODUCTION

1. In this Memorandum Opinion and Order (Order), we address the request of PTC-220, LLC (PTC-220)—a consortium of the nation’s seven Class I freight railroads¹—for modification of six existing 220 MHz Band service rule waivers.² The Wireless Telecommunications Bureau (Bureau) originally granted PTC-220 the rule waivers to enable deployment of Congressionally-mandated Positive Train Control (PTC) safety systems in the 220 MHz Band.³ PTC-220 states that its member railroads have implemented interoperable PTC systems as required by Congress, and PTC-220 now requests modification of the rule waivers. Specifically, PTC-220 requests that we expand the scope of the waiver relief to enable the deployment of additional (i.e., non-PTC) railroad safety systems.⁴ For the reasons that follow, we grant PTC-220’s request subject to the terms and conditions enumerated below. Today’s action will enable U.S. freight, intercity passenger (including Amtrak), and commuter railroads to deploy life- and property-saving⁵ safety systems using PTC-220’s extensive 220 MHz Band spectrum holdings⁶ across the nation.

II. BACKGROUND

2. *Positive Train Control.* The Rail Safety Improvement Act of 2008, as amended by the Positive Train Control Enforcement and Implementation Act of 2015 (together, the Rail Safety Act), required most U.S. freight, intercity passenger, and commuter railroads to install and operate interoperable PTC systems by December 31, 2018.⁷ PTC systems are designed to reduce the risk of human-error rail accidents, by “prevent[ing] train-to-train collisions, over-speed derailments, incursions into established work zone limits, and the movement of a train through a switch left in the wrong position.”⁸

3. Forty one railroads are subject to the PTC mandate, including PTC-220’s seven members, Amtrak, 28 commuter railroads, and five other freight railroads that host regularly scheduled intercity or

¹ PTC-220’s seven member railroads include: BNSF Railway Company; Canadian National Railway Company; Canadian Pacific Railway Company; CSX Corporation; Kansas City Southern; Norfolk Southern Corporation; and Union Pacific Corporation. U.S. railroads are designated as Class I, II, or III, according to annual revenue criteria.

² Request for Modification of Waivers Associated with PTC-220’s 220 MHz Band Licenses (March 23, 2022) (on file under lead ULS File No. 0009965899 (WQSK949)) (Waiver Modification Request); Letter from Michele Farquhar, Counsel to PTC-220, to Marlene H. Dortch, Secretary, FCC (Sept. 7, 2022) (on file under lead ULS File No. 0009965899 (WQSK949)) (Waiver Modification Request Supplement). The Appendix to this Order includes a comprehensive list of file numbers, call signs, and corresponding rule waivers sought by PTC-220.

³ *PTC-220, LLC, Request for Waiver to Facilitate Deployment of Positive Train Control Systems*, WT Docket No. 13-59, Memorandum Opinion and Order, 30 FCC Rcd 2281 (WTB MD 2015) (*2015 Waiver Order*) (waiving 47 CFR §§ 90.723(f) (coordination requirements) and 90.729(b) (antenna height and power limits)); *Request of PTC-220, LLC for Waivers of Certain 220 MHz Rules*, WT Docket No. 08-256, Memorandum Opinion and Order, 24 FCC Rcd 8537 (WTB 2009) (*2009 Waiver Order*) (waiving 47 CFR §§ 90.713(a) and 90.717(b) (commercial use restrictions), 90.715 (base/mobile band configuration), and 90.735 (station identification requirements)).

⁴ See generally Waiver Modification Request.

⁵ See 47 U.S.C. § 151 (establishing the Commission for the “purpose of promoting safety of life and property through the use of wire and radio communications”).

⁶ Waiver Modification Request, Appendix A (listing PTC-220’s 220 MHz Band licenses and leases).

⁷ Rail Safety Improvement Act of 2008, Pub. L. No. 110-432, § 104, 122 Stat. 4848, 4857 (2008), *amended by* Positive Train Control Enforcement and Implementation Act of 2015, Pub. L. No. 114-73, § 1302, 129 Stat. 568, 576 (2015).

⁸ 49 U.S.C. § 20157(i)(5). The U.S. rail industry chose to implement PTC through wireless networks that use radio spectrum. These networks have the capacity to enable real-time information sharing between trains, rail wayside devices, and “back office” applications, regarding train movement authorities, speed restrictions, train position and speed, and the state of signal and switch devices.

commuter rail passenger service.⁹ Four railroads timely met the December 31, 2018, PTC implementation deadline.¹⁰ As the Rail Safety Act permits, the remaining railroads subject to the PTC mandate, including PTC-220's seven member railroads, requested up to a two-year extension, until December 31, 2020, to implement PTC.¹¹ The Federal Railroad Administration (FRA) found that these railroads met the statutory criteria necessary to qualify for an extended implementation schedule and, subsequently, found that they met their extended PTC deadlines.¹²

4. *PTC-220.* PTC-220 was formed to acquire and manage the necessary spectrum resources for its member railroads to deploy interoperable PTC systems across the United States.¹³ PTC-220 has acquired spectrum in both the 220 MHz Band and, more recently, in the adjacent Automated Maritime Telecommunications System (AMTS) Band to implement PTC. PTC-220 also leases its spectrum to numerous other railroads, including passenger and commuter railroads, to enable their PTC implementation.¹⁴

5. *220 MHz Band Licenses.* PTC-220 holds thirty-one 220 MHz Band geographic-area licenses (including Phase I and Phase II Nationwide, Regional Economic Area Group (REAG), and Economic Area licenses)¹⁵ for its members and their tenant railroads to deploy PTC.¹⁶ PTC-220 also leases spectrum for its members to deploy PTC under six 220 MHz Band REAG licenses held by the

⁹ U.S. Department of Transportation (USDOT), Federal Railroad Administration (FRA), *Positive Train Control (PTC) Overview* (last updated Dec. 12, 2022), <https://railroads.dot.gov/train-control/ptc/positive-train-control-ptc> (last visited Jan. 26, 2023) (FRA PTC Overview).

¹⁰ USDOT, *Statement on Positive Train Control Implementation* (last updated Dec. 31, 2018), <https://www.transportation.gov/briefing-room/statement-positive-train-control-implementation> (last visited Jan. 26, 2023).

¹¹ *Id.*

¹² FRA PTC Overview. The FRA is responsible for approving each railroad's PTC system, including design, testing, and implementation and for ensuring compliance with the Rail Safety Act and FRA regulations implementing that statute. USDOT, FRA, *Positive Train Control (PTC) Information (R&D) Summary* (last updated Nov. 13, 2019), <https://www.fra.dot.gov/Page/P0152> (last visited Jan. 26, 2023).

¹³ Waiver Modification Request at 2. The Rail Safety Act requires U.S. railroads to deploy interoperable PTC systems so that when a railroad enters another's territory as a tenant, it can safely use the host rail's PTC system where required. 49 U.S.C. § 20157(a)(2)(A)(i)(1) (a railroad "must provide for interoperability of the system with the movements of trains of other railroad carriers over its lines"). The Rail Safety Act defines "interoperability" as "the ability to control locomotives of the host railroad and tenant railroad to communicate with and respond to the positive train control system, including uninterrupted movements over property boundaries." *Id.* § 20157(i)(3).

¹⁴ For example, under call sign WPOI701, PTC-220 has over 50 active spectrum manager leases. *See, e.g.*, ULS Lease ID Nos. L000019677 (Peninsula Corridor Joint Powers Board (CALTRAIN)); L000010093 (Southern California Regional Rail Authority (SCRRA/Metrolink)); L000018163 (Penn Central Communications (Conrail)); L000017508 (Northeast Illinois Regional Commuter Railroad Corporation (Metra)); L000020184 (National Railroad Passenger Corporation (AMTRAK)); L000026624 (Massachusetts Bay Transportation Authority); L000043044 (Utah Railway Company); L000046404 (Fort Worth Transportation Authority (Trinity Metro)); L000043219 (Florida East Coast Railway). *See also* ULS Lease ID No. L000025125, File Nos. 6059QASL19 (subleasing WPOI701 to Kansas City Terminal Railway Company), 6056QASL19 (subleasing WPOI701 to Dallas Area Rapid Transit).

¹⁵ 220 MHz Band licenses initially authorized from applications filed on or before May 24, 1991, are referred to as Phase I licenses. 47 CFR § 90.701(b). 220 MHz Band licenses initially authorized from applications filed after May 24, 1991, are referred to as Phase II licenses. 47 CFR § 90.701(c).

¹⁶ Waiver Modification Request, Appendix A (listing PTC-220's 220 MHz Band licenses).

Association of American Railroads (AAR Spectrum Leases).¹⁷

6. *2009 Waiver Order*. In the *2009 Waiver Order*, the Bureau granted PTC-220 a waiver of four 220 MHz Band operational rules to enable deployment of PTC systems in the 220 MHz Band.¹⁸ The four rules include: sections 90.713(a) and 90.717(b) (restricting certain 220 MHz Band nationwide licenses to commercial use); section 90.715(a) (assigning base station frequencies from the 220-221 MHz band segment and mobile station frequencies from the 221-222 MHz band segment); and section 90.735 (requiring station identification).¹⁹

7. The Bureau found that waiver of section 90.715's base/mobile configuration requirements would serve the public interest by enabling PTC deployment "in highly congested areas shared by multiple freight and commuter railroads."²⁰ It also found that waiver of the commercial use restrictions contained in sections 90.713(a) and 90.717(b) would promote the public interest by allowing PTC-220 to implement a PTC system on a private basis.²¹ The Bureau emphasized that the relief was "inextricably tied" to the PTC mandate and the substantial public interest benefits that would accrue from a nationwide interoperable rail safety network.²² Following grant of the four rule waivers, PTC-220 acquired numerous additional 220 MHz Band licenses. The Bureau extended the 2009 rule waivers to these subsequently-acquired licenses to enable PTC deployment.²³

8. *2015 Waiver Order*. In the *2015 Waiver Order*, the Bureau granted PTC-220 a waiver of two additional rules to facilitate deployment of PTC systems in the 220 MHz Band:²⁴ section 90.729(b), which prohibits licensees from operating stations in the 221-222 MHz band segment with an effective radiated power (ERP) greater than 50 watts and with an antenna height above average terrain (HAAT) higher than 7 meters;²⁵ and section 90.723(f), which requires coordination between certain Phase II 220 MHz licensees' facilities to ensure that frequencies are selected to avoid interference in the 220 MHz Band.²⁶ The Bureau stated that the rule waivers were "inseparably tied" to Congress' PTC mandate and limited to PTC.²⁷

9. *AMTS Band Licenses and Rule Waivers*. During the course of its members' PTC deployments, PTC-220 determined that its 220 MHz Band spectrum holdings were insufficient for its

¹⁷ *Id.* (listing AAR 220 MHz Band licenses and related leases). AAR is a trade association whose members include the seven U.S. Class I railroads as well as smaller non-Class I and passenger railroads including Amtrak. *AAR Members*, <https://www.aar.org/about-us/aar-members/> (last visited Jan. 26, 2023).

¹⁸ *2009 Waiver Order*, 24 FCC Rcd at 8544-46, paras. 18-20.

¹⁹ 47 CFR §§ 90.713(a), 90.715, 90.717(b), and 90.735. The Bureau applied the rule waivers to PTC-220's (then) twelve 220 MHz Band licenses: two Phase I nationwide licenses (WFPF444 and WPFR284); one L Block nationwide license (WPOI701); six J Block REAG licenses (WPOI702, WPOI703, WPOI704, WPOI705, WPOI706, and WPOI708); and three E Block Economic Area licenses (WPOI774, WPOI800, and WPVL860). *See generally 2009 Waiver Order*. In 2015, the Bureau consented to PTC-220's assignment of its six J Block REAG licenses to AAR. *PTC-220 LLC*, Letter Order, 30 FCC Rcd 4635 (WTB MD 2015) (*2015 PTC-220 Order*). AAR currently leases spectrum under the six licenses to PTC-220. Waiver Modification Request, Appendix A, nn.1-6.

²⁰ *2009 Waiver Order*, 24 FCC Rcd at 8544-45, para. 18.

²¹ *Id.* at 8545-46, para. 20.

²² *Id.* at 8544, para. 17.

²³ *See, e.g.*, license condition appearing on call sign WQSK949 (limiting waivers to PTC).

²⁴ *2015 Waiver Order*, 30 FCC Rcd at 2283-86, paras. 9-17.

²⁵ 47 CFR § 90.729(b).

²⁶ 47 CFR § 90.723(f).

²⁷ *2015 Waiver Order*, 30 FCC Rcd at 2293, para. 45.

members to deploy robust, reliable PTC systems in areas of congested rail operations.²⁸ PTC-220 also determined that there was insufficient 220 MHz Band spectrum available on the secondary market to meet its members' additional spectrum needs.²⁹ To address this spectrum shortfall, PTC-220 acquired up to 500 kilohertz of spectrum in the adjacent 219.5-220 MHz portion of the AMTS Band in AMTS Regions 2, 3, 4, 5, 6, and 10 (call signs WRDI936, WRQI879, WRDH825, WRDH826, WRDH972, and WRKK374, respectively), providing its members AMTS spectrum coverage across much of the country. PTC-220's members' existing PTC radios can already tune to these frequencies, making AMTS channels easy to "pool" with PTC-220's 220 MHz channels for use in PTC networks.³⁰

10. In 2021, the Bureau granted PTC-220 a waiver of several Part 80 rules to enable use of the AMTS frequencies for PTC as well as other rail safety (i.e., non-PTC) systems.³¹ PTC-220 requests that we modify the scope of its six 220 MHz Band rule waivers to permit deployment of both PTC and other rail safety systems, consistent with the waiver relief we granted for its AMTS Band spectrum.³²

III. DISCUSSION

11. For the reasons that follow, we find that the public interest in the safety of life and property and efficient use of spectrum will be served by granting PTC-220's request to modify the scope of six 220 MHz Band rule waivers to extend relief beyond PTC-specific uses to now include the deployment of additional (non-PTC) rail safety systems. Below, we first address whether modifying the rule waivers would be consistent with their fundamental purpose of enabling PTC deployment in the 220 MHz Band. Second, we discuss the benefits of allowing PTC-220 to deploy additional rail safety systems in the 220 MHz Band with the requested waiver relief. Third, we discuss modification of each rule waiver and related conditions concerning deployment of additional rail safety systems in the 220 MHz Band. Fourth, we address several related matters, including enhanced interference mitigation

²⁸ Waiver Modification Request at 9.

²⁹ *Id.*

³⁰ *Id.*; *Application of Thomas K. Kurian for Partitioning and Disaggregation of License for Automated Maritime Telecommunications System Station WQCP809 to PTC-220, LLC*, Order, 35 FCC Red 13105, 13110-11, para. 18 (WTB MD 2020) (finding that "the proposed assignment of spectrum to enhance PTC and other rail safety systems will serve the public interest, convenience, and necessity").

³¹ *PTC-220, LLC for Modification of Licenses for Automated Maritime Telecommunications System Stations WRDI936, WRDH825, WRDH826, and WRDH972*, Order, DA 21-1645, 2021 WL 6135309, *4-7, paras. 16, 20-27 (WTB MD rel. Dec. 27, 2021) (*2021 AMTS Waiver Order*). In that *Order*, the Bureau waived the following rules to facilitate the deployment of PTC and other rail safety applications in the AMTS Band: 47 CFR §§ 80.92(a) (requiring a licensee to monitor a frequency before transmitting, except for distress signals monitoring); 80.105 (requiring coast stations to receive calls from ship and aircraft stations); 80.106 (requiring a coast station to receive communications from mobile stations and to transmit communications delivered to it, which are directed to mobile stations); 80.123(a) (requiring an AMTS land station to secure a letter authorizing the land station to communicate with a coast station); 80.123(b) (requiring coast stations to afford priority to marine-originating communications); 80.123(f) (providing that AMTS land stations may only communicate with public coast stations); 80.215(h)(5) (requiring coast stations' transmitter power, as measured at the input terminals to the station antenna, to be 50 watts or less); and 80.385(a)(2) (dividing the AMTS Band into coast (base) station frequencies (217-218 MHz) and ship (mobile) station frequencies (219-220 MHz)).

³² *See, e.g.*, Waiver Modification Request at 5. In the short term, PTC-220's member railroads are using AMTS spectrum to implement two additional PTC common channels; locomotive radios use these channels to attach to PTC base stations and receive instructions regarding the proper frequency to use in an area, thereby improving system reliability and safety. *David Martin, Esq., PTC-220 LLC, Call Sign WRKK374*, Letter Order, 36 FCC Red 17160, 17162 (WTB MD 2021). In the long term, PTC-220 also intends to leverage the AMTS spectrum to support: (1) other railroad safety applications, including End-of-Train devices and distributed power systems; and (2) future safety-related applications, such as improvements to the monitoring of grade crossing equipment. *2021 AMTS Waiver Order*, 2021 WL 6135309, *2, para. 8 (noting that the railroads will deploy AMTS spectrum to support both PTC and other "train control safety applications, including End-of-Train devices and distributed power systems").

requirements and compliance with historic preservation and environmental review requirements.

12. *Waiver Standard.* Under section 1.925 of the Commission’s rules, the Commission may grant a request for waiver where: (i) the underlying purpose of a rule would not be served or would be frustrated by its application, and a grant of the requested waiver would be in the public interest; or (ii) given unique or unusual factual circumstances, application of a rule would be inequitable, unduly burdensome or contrary to the public interest, or the applicant has no reasonable alternative.³³ Under section 1.3 of the Commission’s rules, the Commission may waive a rule, in whole or in part, on its own motion or on petition for good cause.³⁴ Below, where applicable, we discuss application of these standards to PTC-220’s Waiver Modification Request.

A. Positive Train Control Will Have the Highest Priority in the 220 MHz Band

13. PTC-220 explains that with the rule waivers granted in the *2009 Waiver Order* and in the *2015 Waiver Order*, its member railroads completed their PTC implementation in November 2020, with over 57,000 railroad route miles covered by PTC service.³⁵ According to the FRA, all railroads subject to the PTC mandate met their obligation to deploy PTC by year-end 2020.³⁶ PTC-220 asserts that allowing its members to deploy additional rail “safety applications will not adversely impact the railroads’ ability to operate PTC systems in the 220 MHz band” because “[a]ll of the licenses will continue to be used for PTC, which will have the highest priority of any application.”³⁷ PTC-220 states that any additional rail safety applications “will only be implemented in areas where there is sufficient spectral capacity.”³⁸

14. Based on the record before us, we find that the Bureau’s goal in limiting the initial waiver relief to PTC—to enable deployment of interoperable PTC systems as mandated by Congress³⁹—will not be undermined by permitting railroads to deploy complementary rail safety systems in the 220 MHz Band. Consistent with PTC-220’s commitment, we will require PTC-220, as a condition of modifying the rule waivers, to afford PTC the highest priority on its 220 MHz Band spectrum. Specifically, PTC-220, and any other entity using PTC-220’s currently licensed 220 MHz spectrum—including transferees, assignees, partitionees, disaggregatees, and lessees—may only implement additional (non-PTC) rail safety applications if the spectrum is unnecessary for PTC. Accordingly, should PTC-220 seek to lease or otherwise convey any of its currently licensed 220 MHz spectrum for rail safety purposes other than PTC, it must certify that the spectrum is not required by any of its members, their tenant railroads, and spectrum lessees to implement PTC.⁴⁰

³³ 47 CFR § 1.925(b)(3).

³⁴ 47 CFR § 1.3.

³⁵ Waiver Modification Request at 21 (noting that “as of November 2020, PTC has been fully implemented across the country, with 3,439 PTC base stations and over 28,000 wayside stations”).

³⁶ FRA PTC Overview, *supra* note 9. The FRA stated that PTC was operative “on all 57,536 required freight and passenger railroad route miles,” and that the railroads had achieved interoperability “between each applicable host and tenant railroad that currently operates on PTC-governed main lines.” *Id.*

³⁷ Waiver Modification Request at 2, 22.

³⁸ *Id.* at 6.

³⁹ As noted above, in the *2015 Waiver Order*, the Bureau emphasized that the waiver of sections 90.723(f) (coordination requirements) and 90.729(b) (antenna height and power limits) was “inseparably tied” to the PTC mandate and specifically “limit[ed] the relief to PTC systems.” *2015 Waiver Order* 30 FCC Rcd at 2293, para. 45.

⁴⁰ PTC-220 may lease or assign its 220 MHz spectrum with associated rule waivers for PTC use and, if there is sufficient excess capacity, for non-PTC rail safety applications. PTC-220 also may lease or assign its 220 MHz spectrum without associated rule waivers for other purposes (such as utility operations), but only upon an affirmative showing that the spectrum is unnecessary for PTC or another rail safety application, including prospectively. Thus, for example, PTC-220 may not lease or assign for utility operations any spectrum that could be used for future deployment of PTC on a currently non-PTC equipped rail line or future deployment of a non-PTC

(continued...)

B. Modification of the Rule Waivers Will Promote the Safety of Life and Property

15. We agree with PTC-220 that the public interest will be served by modifying the current PTC rule waivers so that its 220 MHz Band licenses could be used to deploy additional rail safety systems on both PTC- and non-PTC equipped rail corridors,⁴¹ thereby serving the Commission's core policy goals of promoting the safety of life and property. PTC-220's members own and operate over 90,000 route miles across the nation.⁴² Outside of the Northeast Corridor (which extends from Boston to Washington, DC), PTC-220's member-owned tracks host most of Amtrak's intercity passenger rail operations and, in many places, host commuter rail operations.⁴³ Although PTC-220's 220 MHz Band licensed spectrum and the spectrum it leases from AAR cover the U.S. rail network,⁴⁴ the spectrum is underutilized in many areas because the 220 MHz Band rule waivers' current PTC-only limitation precludes the deployment of non-PTC rail safety systems.⁴⁵ In areas where track is not PTC-equipped, valuable spectrum lies fallow because of the PTC-only limitation.⁴⁶

16. In its Waiver Request, PTC-220 states that because of propagation characteristics and its nationwide footprint, its 220 MHz Band licensed spectrum is ideally suited for the deployment of additional rail safety systems.⁴⁷ PTC-220 states that modifying the rule waivers' scope will enable not only its seven member railroads, but also their tenants, including commuter railroads and Amtrak, and PTC-220's many railroad spectrum lessees, to deploy critical rail safety systems in the 220 MHz Band.⁴⁸ As explained in more detail below, these systems fall into two broad categories: (1) train operation systems, which control, or provide critical messages for, train operations including End-of-Train (EOT) devices and distributed power systems; and (2) wayside (that is, trackside) support systems, which

rail safety application (such as grade crossing control) on any rail line. A third party seeking to acquire PTC-220's 220 MHz spectrum for a purpose other than PTC or a non-PTC rail safety application may request and separately justify waiver relief; we will evaluate waiver requests case by case on their merits.

⁴¹ Waiver Modification Request at 2-3. PTC-220 argues that, conversely, maintaining the PTC-only restriction is tantamount to legacy "command and control" regulation, which the Commission has abandoned in favor of flexible use policies. *Id.* (citing FCC, *Connecting America: The National Broadband Plan*, at 78 (2010)), available at <https://bit.ly/3tu9tVo>. While PTC-220 has acquired AMTS Band spectrum across much of the country, there remain large areas where it has been unable to acquire AMTS Band spectrum on the secondary market. Waiver Modification Request at 9. PTC-220 does, however, have 220 MHz Band coverage in areas where it lacks AMTS coverage. Grant of the 220 MHz Band waiver relief requested here, PTC-220 asserts, therefore will ensure that there are no areas where railroads are unable to deploy rail safety applications because of PTC-220's limited AMTS coverage. *Id.* at 18-19.

⁴² AAR, *Understanding Intercity Passenger, Commuter & Freight Railroads*, <https://www.aar.org/integrated-rail-network> (last visited Jan. 26, 2023). Approximately 630 short line railroads (Class II and III railroads) operate over approximately 45,000 route miles in 49 states. *Id.* For large areas of the country and particularly for small town rural America, short line rail service connects farmers and businesses to the national railroad network. *Id.*

⁴³ *Id.*

⁴⁴ Waiver Modification Request, Appendix A.

⁴⁵ PTC-220 asserts that although a waiver modification may not be needed to deploy safety applications that are integrated into a PTC system, modification would still be needed to permit deployment of these applications on lines that are not equipped with PTC. *Id.* at 3, 15.

⁴⁶ *Id.* at 20.

⁴⁷ *Id.* at 18.

⁴⁸ Waiver Modification Request Supplement at 2 (asserting that "these benefits will inure not only to PTC-220, which can more efficiently enable the safety applications on its network, but also to the dozens of freight, passenger, and commuter railroads across the United States that lease the spectrum and will utilize those safety applications to protect property and passengers' lives").

monitor and measure certain operations, helping safeguard the public.⁴⁹ PTC-220 also states that its member railroads intend to deploy advanced grade crossing technologies in the 220 MHz Band.⁵⁰

1. Train Operation Systems

17. PTC-220 proposes to transition two key train safety systems—EOT devices and distributed power systems—from the 450 MHz Band, where they now operate, to the 220 MHz Band.⁵¹ PTC-220 states that “[t]he 220 MHz Band features better propagation characteristics than the 450 MHz band” and that using existing “PTC base stations for EOT device traffic would dramatically improve EOT communications reliability.”⁵² PTC-220 explains that “[p]ermitting railroads to use the 220 MHz band for distributed power systems will allow railroads to more effectively and efficiently transition distributed power communication links to the PTC network infrastructure,” which is optimized for 220 MHz Band traffic.⁵³

a. End-of-Train (EOT) Devices

18. EOT deployments include a radio at a train’s end, which transmits brake line pressure and other vital information to a locomotive unit, where an engineer receives the information.⁵⁴ The end unit must be mounted on the coupling knuckle behind the train’s last car; this design means that the transmission path from the end unit to the locomotive unit is always blocked by intervening rail cars,⁵⁵ and the trend towards longer trains has exacerbated the problem.⁵⁶ For example, two of PTC-220’s members had average train lengths of 1.2 and 1.4 miles in 2017, and some trains are as long as three miles.⁵⁷

19. PTC-220 explains that properly functioning EOT devices are essential for safe train operations: interruption of the communications link between the end unit and the locomotive unit will stop a train as a precautionary measure, increasing the potential for derailment.⁵⁸ The FRA recently emphasized the importance of properly functioning EOT devices in a Safety Advisory focusing on accident mitigation when operating longer trains.⁵⁹ The FRA’s recommendations “to ensure the safe operation of such trains” include “tak[ing] appropriate action to prevent the loss of communications

⁴⁹ Waiver Modification Request at 14-18.

⁵⁰ *Id.* at 17.

⁵¹ *Id.* at 15-16.

⁵² *Id.* at 15.

⁵³ *Id.* at 16. See also USDOT, FRA, *Railroad Wireless Communications Roadmap* at 50-51 (Mar. 2020) (FRA Roadmap Report) (noting the 220 MHz Band is well suited for deployment of certain rail safety applications), <https://railroads.dot.gov/sites/fra.dot.gov/files/2020-3/Railroad%20Wireless%20Communications%20Roadmap.pdf>.

⁵⁴ Waiver Modification Request at 15; FRA Roadmap Report at 7.

⁵⁵ Waiver Modification Request at 15.

⁵⁶ *Id.*

⁵⁷ U.S. Government Accountability Office, Report to Congressional Requesters (GAO-19-443), *Rail Safety: Freight Trains are Getting Longer, and Additional Information is Needed to Assess Their Impact* at 11-12 (May 2019), available at <https://www.gao.gov/products/gao-19-443>.

⁵⁸ Waiver Modification Request at 15. In 2013, the Commission found that EOT devices “benefit the public by increasing the safety of life and property for railroads and their employees, and for people in communities through which trains travel.” *Amendment of Part 90 of the Commission’s Rules*, PR Docket No. 89-552, Fifth Report and Order, 28 FCC Rcd 5924, 5925, para. 4 (2013).

⁵⁹ USDOT, FRA, Safety Advisory 2023-03; Accident Mitigation and Train Length, 88 Fed. Reg. 27570 (May 2, 2023). The Safety Advisory discusses three significant derailment incidents in 2023 involving trains longer than two miles with at least 200 cars. *Id.* at 27571.

between end-of-train devices”⁶⁰ The Safety Advisory explains that longer trains are more prone to experience EOT device signal loss because of the longer distance signals must travel (compared to shorter trains), and highlights the potentially dire consequences of a signal loss between EOT devices.⁶¹ The FRA “recommends that railroads implement technologies, policies, procedures, and any necessary hardware enhancements to ensure two-way EOT devices maintain continuous and undisrupted communications to and from the front and rear units.”⁶²

20. PTC-220 states that channel capacity cannot be expanded, nor can congestion management be supported, within the 450 MHz Band for any application facing scarcity of bandwidth.⁶³ PTC-220 asserts that this is a particular concern for the EOT application, whose single 12.5 kilohertz channel is heavily used and is often exhausted.⁶⁴ According to PTC-220, the use of 220 MHz Band spectrum and the railroads’ extensive network of 220 MHz Band base stations for EOT device communications links would markedly improve EOT device reliability.⁶⁵

b. Distributed Power Systems

21. In a distributed power system, one or more locomotives are placed within or at the end of a train to reduce in-train stresses related to braking and pulling.⁶⁶ PTC-220 states that the use of additional locomotives in certain mountainous terrain and the rail industry’s trend towards longer trains has worsened the problem of unreliable communications links for distributed power systems.⁶⁷ PTC-220 explains that when a distributed power system’s communications link is disrupted, locomotives can lose synchronization, creating stresses at the connecting knuckles and increasing the risk that train cars will separate.⁶⁸ When separation occurs, brakes typically engage, which can lead to unsafe stopping.⁶⁹

22. Train crews currently use 450 MHz Band spectrum to control additional locomotives remotely from a lead locomotive.⁷⁰ Although the 450 MHz Band has up to 13 channel pairs totaling 325 kilohertz of available spectrum for use by the railroad industry, these channels are not fungible.⁷¹ They are divided up by safety application for dedicated use; for example, distributed power uses four dedicated

⁶⁰ *Id.* at 27570-71; *see also id.* at 27572.

⁶¹ *Id.* at 27572 (noting that such loss of communication “can be temporary or permanent, and can result in an emergency air brake signal from the controlling locomotive taking longer to propagate through the entire train (effectively slowing down braking of the entire consist), or in the event of a train air brake line blockage, a loss of communication between the EOT devices will result in the emergency signal not being transmitted to the rear EOT device”).

⁶² *Id.*

⁶³ Declaration of Alan L. Polivka, Senior Scientist II, Communications & Train Control, MxV Rail, dated July 21, 2022, at 8, para. 19, attached to Waiver Modification Request Supplement (Polivka Declaration).

⁶⁴ *Id.*

⁶⁵ Waiver Modification Request at 15. PTC-220 reports that U.S. railroads currently are developing new EOT standards that include vibration sensors as well as GPS location for the rear of the train, and that the information regarding the location of the end of the train (more precise than what is available today) will be transmitted to traffic control. It adds that, while not part of the minimum requirements for PTC, this feature will be integrated into the overall traffic control systems and will help reduce rear-end collisions. *Id.*

⁶⁶ *Id.* at 16.

⁶⁷ *Id.*

⁶⁸ *Id.*

⁶⁹ *Id.*

⁷⁰ *Id.*

⁷¹ Polivka Declaration at 8, para. 19.

channels.⁷² PTC-220 states that more flexibility to utilize the 220 MHz Band for distributed power and other safety systems would mitigate engineering challenges where the rails have exhausted 450 MHz Band capacity.⁷³

2. Wayside Support Systems

23. PTC-220 proposes that railroads use 220 MHz Band spectrum to support existing wayside support systems (for example, trackside detectors) and wayside systems under development, including wireless control of grade-crossing equipment.⁷⁴

a. Trackside Detectors

24. Railroads deploy an array of wireless trackside detectors along rights-of-way, which scan passing trains and the environment for factors that may threaten public safety.⁷⁵ For example, trackside hot bearing detectors (HBDs) are used to measure the temperature of wheel bearings to prevent meltdown.⁷⁶ Trackside sensors also can alert users to objects dragging from passing trains; identifying loose or partially detached objects on trains (for example, an air hose or pipe) can prevent human injury and damage to rail infrastructure and help avoid derailments.⁷⁷ Also, trackside sensors can detect and communicate the existence of environmental obstacles that may pose a threat to public safety, including low-bridge clearances and rock slides.⁷⁸ Additionally, wayside devices are used to read automatic equipment identifiers (that is, radiofrequency tags on rail cars), which can be used to confirm that cars on the train meet a route's height or width restrictions.⁷⁹ PTC-220 states that railroads "continue to identify other external stimuli that would be suitable for real-time trackside detection" using 220 MHz Band spectrum.⁸⁰

b. Hi-rail Limits Compliance Systems

25. PTC-220 proposes to enhance rail worker safety by using 220 MHz Band spectrum to deploy Hi-rail Limits Compliance Systems (HLCS), which are designed to ensure safe operation of steel-wheel maintenance vehicles when operating on railroad tracks.⁸¹ HLCS use Global Positioning Systems (GPS) to monitor the location of hi-rail vehicles, compare their location against the track authorization limits issued to the vehicle, and alert the operator if the vehicle is operating outside of its authorized limits.⁸² HLCS also have radios, which allow a hi-rail vehicle operator to notify a dispatcher of

⁷² 47 CFR § 90.35.

⁷³ Polivka Declaration at 8, para. 19.

⁷⁴ Waiver Modification Request at 16-18.

⁷⁵ *Id.* at 16.

⁷⁶ *Id.* According to the National Transportation Safety Board (NTSB), a Norfolk Southern Railway freight train derailed in East Palestine, Ohio on February 3, 2023, shortly after an HBD "transmitted a critical audible alarm message instructing the crew to slow and stop the train to inspect a hot axle." NTSB, Preliminary Report RRD23MR005, *Norfolk Southern Railway Train Derailment with Subsequent Hazardous Material Release and Fires* at 2-3 (issued Feb. 22, 2023), <https://www.nts.gov/investigations/Documents/RRD23MR005%20East%20Palestine%20OH%20Prelim.pdf>. The NTSB reported that "[s]urveillance video from a local residence showed what appeared to be a wheel bearing in the final stage of overheat failure moments before the derailment." *Id.* at 3.

⁷⁷ Waiver Modification Request at 16.

⁷⁸ *Id.*

⁷⁹ *Id.*

⁸⁰ *Id.*

⁸¹ *Id.*

⁸² *Id.*; FRA Roadmap Report at 5.

emergencies.⁸³

c. Grade-Crossing Safety Systems

26. According to preliminary FRA data, in 2021, there were over 2,200 collisions at U.S. highway-rail grade crossings, resulting in 235 fatalities and 669 injuries.⁸⁴ Local authorities frequently complain about the length of time that crossing gates remain down (or signals remain red), especially where trains approach a crossing very slowly, or stop short of a crossing.⁸⁵ This is a common issue for commuter railroads, which often have station stops near grade crossings. And blocked crossings can frustrate motorists into taking the unsafe action of physically raising crossing arms to cross tracks.⁸⁶ PTC-220 seeks a modification of its existing rule waivers to enable it to use its 220 MHz spectrum holdings to improve the safety of the nation's grade crossings.⁸⁷

27. *Equipment Monitoring.* Currently, railroads rely on monthly physical inspections required by FRA rules to monitor the condition of grade-crossing safety equipment.⁸⁸ PTC-220 states that 220 MHz Band spectrum would be well suited to monitoring wirelessly the status of grade-crossing equipment including signals and gates.⁸⁹ PTC-220 explains that implementation of wireless monitoring grade-crossing equipment would enable railroads to respond quickly to equipment malfunctions, thereby minimizing equipment “downtime” and improving public safety.⁹⁰

28. *Wireless Grade Crossing Control.* According to PTC-220, FRA officials have encouraged railroads to find a solution to the “gates-down” problem, which occurs when sensors activate rail crossing gates when a train passes a predetermined point.⁹¹ Sensors are set far enough back from a crossing to allow sufficient time for gates to close, while assuming that the train is moving at maximum allowed speed. If the train is moving more slowly, the gates will close prematurely, and if the train stops before reaching the crossing, the gates might remain closed even though there is no imminent danger of a passing train.⁹²

29. To solve the gates-down problem, railroads are developing a wireless system that will allow for more precise timing of a crossing closure based on real-time communications between a locomotive and crossing equipment.⁹³ PTC-220 explains that a locomotive onboard computer would radio ahead to the crossing equipment, advising when the train will arrive at the crossing, based on its

⁸³ FRA Roadmap Report at 5.

⁸⁴ Operation Lifesaver, Inc., Collisions & Casualties by Year, *All Highway-Rail Incidents at Public and Private Crossings, 2021-1981* (last updated Dec. 9, 2022), <https://oli.org/track-statistics/collisions-casualties-year> (last visited Jan. 26, 2023). And in the preceding five years, there was an annual average of 257 deaths at U.S. grade crossings. USDOT, FRA, Report No. RR 21-05, *Automated Video Inspection System for Grade Crossing Safety* at 1 (April 2021), <https://railroads.dot.gov/elibrary/automated-video-inspection-system-grade-crossing-safety>.

⁸⁵ Waiver Modification Request at 17.

⁸⁶ *Id.* n.57 (citing Maria Guerrero, *Railroad Crossing Arms Remain Down Minutes on End With No Trains in Sight*, NBCDFW (Aug. 16, 2017) (noting that the prolonged lowering of railroad crossing gates has led motorists to raise the crossing arms manually to let traffic through), <https://bit.ly/3L4DVvg>).

⁸⁷ *See* Waiver Modification Request at 13-14.

⁸⁸ *Id.* at 17.

⁸⁹ *Id.*

⁹⁰ *Id.*

⁹¹ *Id.*

⁹² *Id.*

⁹³ *Id.*

current speed and location.⁹⁴ If a train stops before reaching the crossing, the gates would be disarmed temporarily. PTC-220 explains that on PTC-equipped rail lines, this functionality could be integrated into a PTC system, but on non-PTC equipped track, waiver modifications are needed to permit the deployment of this potentially life-saving application.⁹⁵

C. Modification of Individual Rule Waivers

30. As explained above, modification of the existing rule waivers will enable U.S. freight, passenger, and commuter railroads to deploy an array of innovative life- and property-saving systems on PTC-equipped rail lines using PTC-220's extensive 220 MHz Band spectrum holdings. Equally important, modification of the rule waivers will enable railroads to deploy vital safety systems with 220 MHz Band spectrum that lies fallow on lines that are not currently equipped with PTC. For the reasons stated above and for those that follow, we find that modification of the rule waivers to enable the deployment of additional rail safety applications is warranted.

1. Modification of 2009 Rule Waivers

31. As explained above, in the *2009 Waiver Order*, the Bureau granted PTC-220 a limited waiver of four 220 MHz Band operational rules, applying them to PTC-220's (then) twelve 220 MHz Band licenses, where applicable—for PTC operations only; the Bureau later extended the same limited waiver relief to the additional 220 MHz Band licenses that PTC-220 had subsequently acquired.⁹⁶ The Bureau emphasized that the extraordinary relief was “inextricably tied” to the PTC mandate and the substantial public interest benefits that will accrue from a nationwide interoperable PTC rail safety network.⁹⁷ For the reasons discussed below, we now modify the scope of the four rule waivers to enable deployment of additional (i.e., non-PTC) rail safety systems in the 220 MHz Band.

a. Sections 90.713(a) and 90.717(b), Phase I Nationwide License Commercial-Use Restrictions

32. Sections 90.713(a) and 90.717(b) of the Commission's rules limit Phase I Nationwide 220 MHz Band licenses to commercial use.⁹⁸ In the *2009 Waiver Order*, the Bureau waived the commercial-use restrictions for PTC-220's Phase I Nationwide licenses WFP444 and WPFR284.⁹⁹ The Bureau reasoned that by enabling PTC-220's members to deploy PTC technology on a private basis in the 220 MHz Band, waiver of the commercial-use restrictions would further public safety while serving the Commission's spectrum efficiency and flexibility goals.¹⁰⁰

33. PTC-220 notes that five years before Congress adopted the PTC mandate, the Bureau—in the *2003 AAR Order*—waived the commercial-use restrictions so that AAR's freight railroad members could use nationwide 220 MHz Band license WPWY753 to deploy a non-commercial locomotive switching technology.¹⁰¹ The Bureau found that a waiver of the commercial-use restrictions to enable the

⁹⁴ *Id.*

⁹⁵ *Id.* at 18.

⁹⁶ *See supra* paras. 6-7.

⁹⁷ *2009 Waiver Order*, 24 FCC Rcd at 8544, para. 17.

⁹⁸ 47 CFR §§ 90.713(a) (making channels “available for nationwide, commercial use to non-Government, Phase I applicants”), 90.717(b) (making channels “available to non-Government applicants only for nationwide, commercial Phase I systems”).

⁹⁹ *2009 Waiver Order*, 24 FCC Rcd at 8545-46, para. 20.

¹⁰⁰ *Id.*

¹⁰¹ Waiver Modification Request at 11 (citing *Application for Consent to the Assignment of a Five-Channel 220 MHz Nationwide License (Call Sign WPWY753, formerly WPTC968) from Rush Network Corp. to the Association of American Railroads*, Order, 18 FCC Rcd 24711 (WTB CWD 2003) (*2003 AAR Order*)).

switching technology at some 300 locations would provide “public safety, spectrum efficiency, and spectrum flexibility” benefits.¹⁰² In the *2015 PTC-220 Order*, the Bureau consented to AAR’s assignment of WPWY753 to PTC-220, and granted PTC-220’s request for waiver of the commercial-use restrictions to deploy PTC.¹⁰³ The Bureau stated that a waiver “is appropriate because PTC-220 members and other railroads operate PTC systems on a private, non-commercial basis.”¹⁰⁴

34. The same public safety, spectrum efficiency, and spectrum flexibility benefits cited by the Bureau in the *2009 Waiver Order* and in the *2003 AAR Order* support modifying the waiver of the commercial-use restrictions to enable the railroads’ deployment of additional rail safety systems using all of PTC-220’s 220 MHz Band licenses.¹⁰⁵ Accordingly, because it will “promot[e] the safety of life and property,”¹⁰⁶ we find good cause under section 1.3 of the Commission’s rules to expand the scope of the waiver relief concerning section 90.713(a)’s and section 90.717(b)’s commercial-use restrictions, thereby enabling U.S. railroads using PTC-220’s MHz spectrum or operating on PTC-220’s member-owned tracks (including Amtrak and certain commuter railroads) to deploy key rail safety applications in the 220 MHz Band.

b. Section 90.715(a), 220 MHz Band Base/Mobile Configuration Requirement

35. Commission rule section 90.715(a) provides for frequencies to “be assigned in pairs with base station frequencies taken from the 220-221 MHz band [segment] with corresponding mobile and control frequencies being 1 MHz higher and taken from the 221-222 MHz band [segment].”¹⁰⁷ In the *2009 Waiver Order*, the Bureau noted that PTC systems were designed to transmit and receive in both band segments to ensure functionality.¹⁰⁸ The Bureau waived the 220 MHz Band base/mobile configuration requirements to permit PTC base/mobile stations that can transmit and receive signals on either band segment. The Bureau found that by waiving the base/mobile band configuration rule, the public interest in rail safety would be served, particularly in congested areas shared by multiple freight and commuter railroads.¹⁰⁹

36. Expanding the scope of the section 90.715(a) waiver relief would enable nationwide, regional, and local deployment of additional rail safety applications in the 220 MHz Band on both PTC-equipped and non-PTC rail lines, including in congested areas shared by multiple freight and commuter railroads. We find that under the first prong of the Commission’s section 1.925(b)(3) waiver standard, modifying the waiver of the base/mobile band configuration requirement will serve the public interest in rail safety by facilitating the deployment of an array of spectrally-efficient rail safety systems in both band segments and that the underlying purpose of the rule—to limit interference¹¹⁰—would not be served

¹⁰² *2003 AAR Order*, 18 FCC Rcd at 24714, para. 8.

¹⁰³ *2015 PTC-220 Order*, 30 FCC Rcd at 4635, 4638.

¹⁰⁴ *Id.* at 4638. We note that the Bureau did not limit the waiver to PTC.

¹⁰⁵ The Appendix to this Order provides a list of the licenses subject to today’s modification of the sections 90.713(a) and 90.717(b) rule waivers.

¹⁰⁶ 47 U.S.C. § 151 (establishing the Commission for the “purpose of promoting safety of life and property through the use of wire and radio communications”).

¹⁰⁷ 47 CFR § 90.715(a).

¹⁰⁸ *2009 Waiver Order*, 24 FCC Rcd at 8541, para. 9.

¹⁰⁹ *Id.* at 8544-45, para. 18.

¹¹⁰ According to PTC-220, “[i]n the more than eight years that the railroads have been transmitting in the 220 MHz band (with the nationwide network substantially complete as of 2018), there have been no known cases of harmful interference.” Waiver Modification Request at 3. As explained below, *see infra* para. 60, even if PTC-220 does receive a report of interference related to its rail safety operations, today’s Order requires PTC-220 to investigate and resolve such reports at its own expense within 60 days.

by its strict application here.¹¹¹

c. Section 90.735(a), Station Identification Requirements

37. PTC-220 seeks to deploy additional rail safety systems under a modified waiver of section 90.735(a), which requires certain stations in the 220 MHz Band to identify themselves periodically.¹¹² The rule is intended to ensure that the Commission and other spectrum users can identify sources of potential interference.

38. In the *2009 Waiver Order*, the Bureau concluded that section 90.735's station identification requirements were unnecessary where "licensees operate on exclusive channel blocks on a nationwide basis or in defined regions . . . and are readily identifiable through the Commission's licensing records or other publicly available information."¹¹³ The Bureau stated that the same rationale applied to PTC-220's then six REAG licenses, because they "essentially form a *de facto* nationwide license, and there will be no co-channel users in close geographic proximity."¹¹⁴ In 2015, when the Bureau consented to PTC-220's assignment of the six REAG licenses to AAR, it also granted AAR relief from the station identification requirements, noting that it likewise would be readily identifiable in Commission records to third parties.¹¹⁵ AAR currently leases spectrum under these licenses to PTC-220.¹¹⁶

39. Also in the *2009 Waiver Order*, the Bureau waived the station identification requirements for PTC-220's then three (now eight) geographically smaller E Block Economic Area licenses, subject to several conditions.¹¹⁷ Although potentially interfering transmissions should be limited to areas along rail lines, the Bureau found it prudent to require PTC-220 to meet certain notification procedures to minimize the burden on co-channel adjacent market 220 MHz Band licensees in determining whether or not PTC-220's operations are causing interference.¹¹⁸ Under the procedures adopted by the Bureau:

- PTC-220 must notify all co-channel 220 MHz Band licensees in adjacent markets 30 days prior to commencing operations on any of its E Block Economic Area licenses.
- Notifications must include a point of contact within PTC-220 to address any concerns regarding interference.
- PTC-220 must promptly cure any instances of actual interference that may occur to other 220 MHz Band licensees at its own expense.¹¹⁹

40. Subject to the conditions enumerated above, we find good cause under section 1.3 of the Commission's rules to modify the scope of the waiver of section 90.735(a)'s station identification requirements to permit the deployment of additional rail safety systems in the 220 MHz Band because it will promote the safety of life and property related to U.S. freight, intercity passenger, and commuter rail

¹¹¹ 47 CFR § 1.925(b)(3)(i). The Appendix to this Order provides a list of the licenses subject to today's modification of the section 90.715(a) rule waiver.

¹¹² Waiver Modification Request at 12 (citing 47 CFR § 90.735(a) ("[e]xcept for nationwide systems authorized in the 220-222 MHz band, station identification is required pursuant to § 90.425 of this part").

¹¹³ *2009 Waiver Order*, 24 FCC Rcd at 8544, para. 18.

¹¹⁴ *Id.*

¹¹⁵ 2015 *PTC-220 Order*, 30 FCC Rcd at 4637.

¹¹⁶ Waiver Modification Request, Appendix A.

¹¹⁷ *2009 Waiver Order*, 24 FCC Rcd at 8545, para 19.

¹¹⁸ *Id.* The Bureau also noted that if "an adjacent market licensee does experience co-channel interference, it can determine if the source is a site-specific incumbent because site-specific incumbents will be transmitting station identification information." *Id.* n.68.

¹¹⁹ *Id.* at 8545, para 19. The Bureau also noted that unresolved interference may result in action by the Commission requiring PTC-220 to suspend operation of the offending transmitter until the interference is resolved. *Id.*

operations.¹²⁰

2. Modification of 2015 Rule Waivers

a. Section 90.729(b), Upper 221-222 MHz Band Segment Power and Antenna Height Limits

41. PTC-220 requests modification of the waiver of section 90.729(b),¹²¹ so that it may deploy additional rail safety systems in the upper 221-222 MHz band segment with increased power and antenna height.¹²² Section 90.729(b) limits operations in the upper band segment to an effective radiated power (ERP) of 50 watts and an antenna height above average terrain (HAAT) of 7 meters,¹²³ while stations in the lower band segment are permitted to use up to 500 watts ERP with an antenna HAAT up to 150 meters.¹²⁴ The Commission adopted section 90.729(b)'s power and antenna height limits to address the possibility of interference to co- and adjacent channel operations.¹²⁵

42. The Commission planned the 220 MHz Band as a frequency division duplex band, "with base station frequencies taken from the 220-221 MHz band [segment] with corresponding mobile and control station frequencies being 1 MHz higher and taken from the 221-222 MHz band" segment under section 90.715(a).¹²⁶ As noted above, in the *2009 Waiver Order*, the Bureau granted PTC-220 a waiver of section 90.715(a)'s base/mobile configuration limits.¹²⁷ Although the *2009 Waiver Order* permits base station operations in the upper 221-222 MHz band segment, the upper band segment's more restrictive power and antenna height rules limit its utility for base station operations.

43. In the *2015 Waiver Order*, the Bureau granted PTC-220 a conditional waiver of section 90.729(b)'s power and antenna height limits to enable PTC deployment in the upper 221-222 MHz band segment.¹²⁸ The Bureau noted that without a rule waiver, base station transmissions in the upper band segment would have a much smaller coverage footprint than those in the lower band segment (where higher-powered operations are permitted by rule), which could limit network capacity and require the construction of additional sites.¹²⁹ The Bureau found that waiver of section 90.729(b)'s power and antenna height limits "would serve the public interest of all Americans in rail safety, including the safety of life and property, by facilitating PTC deployments in urban and other areas."¹³⁰ The Bureau also found that waiver of section 90.729(b) would serve the public interest by "enabling more intensive use of PTC-220's unique spectrum resources to deploy advanced rail safety systems."¹³¹ The Bureau reasoned that "strict application of [s]ection 90.729(b)'s power and antenna height limits would be contrary to the public interest in the safety of life and property, and in efficient spectrum use," and authorized PTC

¹²⁰ See 47 U.S.C. § 151. The Appendix to this Order lists the licenses subject to today's modification of the section 90.735(a) rule waiver.

¹²¹ 47 CFR § 90.729(b).

¹²² Waiver Modification Request at 13.

¹²³ 47 CFR § 90.729(b) (but permitting transmissions from antennas higher than 7 meters HAAT if the ERP is reduced below 50 watts ERP by $20 \log_{10}(h/7)$ dB, where h is the HAAT in meters).

¹²⁴ 47 CFR § 90.729(a). When a station in the lower band exceeds 150 meters HAAT, it must reduce its ERP correspondingly. *Id.*

¹²⁵ *2015 Waiver Order*, 30 FCC Rcd at 2285, para. 14.

¹²⁶ 47 CFR § 90.715(a).

¹²⁷ See *supra* para. 33.

¹²⁸ *2015 Waiver Order*, 30 FCC Rcd at 2283-90, paras. 9-33.

¹²⁹ *Id.* at 2284, para. 12.

¹³⁰ *Id.* at 2285, para. 15.

¹³¹ *Id.*, para. 16.

operations in the upper 221-222 MHz band segment at the same power and antenna heights that are permitted, by rule, in the lower 220-221 MHz band segment.¹³²

44. The Bureau's reasoning in the *2015 Waiver Order* and the record before us support expanding the scope of our waiver of section 90.729(b) to enable deployment of additional rail safety systems in the upper band segment with increased power and antenna height. Such relief will provide the U.S. rail industry additional spectrum capacity,¹³³ obviate the need to construct additional towers and wayside poles in areas with existing 220 MHz infrastructure controlled by PTC-220 and, by facilitating deployments of advanced safety applications, serve the public interest of all Americans in rail safety. We find that, under the second prong of the Commission's section 1.925(b)(3) waiver standard, given the unique circumstances here—including the well-recognized public safety benefits of the applications that PTC-220 proposes to deploy in the 220 MHz Band, and the ubiquitous coverage of PTC-220's 220 MHz Band licenses and its extensive infrastructure optimized for the 220 MHz Band¹³⁴—strict application of section 90.729(b)'s power and antenna height limits to the additional rail safety systems would be contrary to the public interest in the safety of life and property, and in efficient spectrum use.¹³⁵

45. In the *2015 Waiver Order*, the Bureau adopted specific measures to ensure that co- and adjacent channel licensees in the 220 MHz Band do not suffer harmful interference from waiver of section 90.729(b)'s power and antenna height limits.¹³⁶ The record reflects that PTC-220's member railroads have deployed PTC in the 220 MHz Band across the nation for seven years under the waiver's less restrictive power and antenna height limits without any verified reports of interference.¹³⁷ Nevertheless, out of an abundance of caution and to ensure that co- and adjacent channel licensees in the 220 MHz Band do not suffer harmful interference from a modified waiver of section 90.729(b)'s power and antenna height limits, we will apply the same measures (including field strength limits, frequency and geographic spacing requirements, and prior notification requirements) to deployments of rail safety systems under the modified rule waiver. These measures are described below.

(i) Field Strength Limit Condition, Economic Area Licenses

46. *Co-Channel Interference.* Among the protective measures adopted by the Bureau in the *2015 Waiver Order* was a requirement that PTC-220 meet a 38 dBμ field strength limit at the license area's border of its then six (now eight) E Block Economic Area licenses for waiver operations in the upper 221-222 MHz band segment.¹³⁸ The Bureau provided that, should a co-channel licensee suffer harmful interference despite PTC-220's compliance with a 38 dBμ field strength limit, PTC-220 must promptly resolve such interference at its own expense.¹³⁹

47. We seek to ensure that adjacent market co-channel spectrum users will not suffer harmful

¹³² *Id.* at 2286, para. 17.

¹³³ Polivka Declaration at 3, para. 7 (noting that “where the level of congestion in the 450 MHz Band is approaching exhaustion, the added flexibility of using the 220 MHz Band to offload wireless traffic in capacity-constrained areas will help ensure that railroads operate safely”).

¹³⁴ *Id.* at 8-9 (noting that the ability to use the 220 MHz Band “for multiple safety-related applications would maximize network effectiveness and minimize the siting requirements needed in more rural and expansive portions of the railway train network”).

¹³⁵ See *2015 Waiver Order*, 30 FCC Rcd at 2286, para. 17; 47 CFR § 1.925(b)(3)(ii). The Appendix to this Order lists the licenses subject to today's modification of the section 90.729(b) rule waiver.

¹³⁶ *2015 Waiver Order*, 30 FCC Rcd at 2287-90, paras. 22-33.

¹³⁷ Waiver Modification Request at 19 (noting that “[i]n the rare cases where another licensee has complained to the railroads of suspected interference, the parties investigated and subsequently determined that the source of interference was not, in fact, PTC operations in the 220 MHz band”).

¹³⁸ *2015 Waiver Order*, 30 FCC Rcd at 2287, paras. 19-20.

¹³⁹ *Id.*, para. 20.

interference that might arise from deployment of additional rail safety systems at increased power or height in the upper 221-222 MHz band segment, and will require deployments under the expanded rule waiver to meet a 38 dB μ field strength limit at the license area border of PTC-220's eight Economic Area E Block licenses.¹⁴⁰ We also will require that, should a co-channel licensee suffer harmful interference despite PTC-220's compliance with a 38 dB μ field strength limit, PTC-220 must promptly resolve such interference at its own expense.

(ii) Geographic and Spectral Separation, and Noise Floor Conditions

48. *Adjacent Channel Interference.* In the *2015 Waiver Order*, the Bureau also adopted frequency and geographic spacing requirements to reduce the possibility that base station operations under the rule waiver could cause interference to adjacent channel licensees.¹⁴¹ The Bureau explained that there would be no guard band between PTC transmitters and other licensees' receivers in the upper 221-222 MHz band segment, and that requiring PTC-220 to comply with frequency and geographic spacing requirements would mitigate the possibility that base station operations under the waiver could cause interference to adjacent channel licensees.¹⁴²

49. The Bureau required PTC-220 to comply with the following geographic and spectral separation requirements, and related power limits:

- PTC-220 must obtain the concurrence of a licensee to site a transmitter within 25 kHz and between 0.3 and 6 kilometers of a non-nationwide Phase I receiver, and must comply with the geographic separation/graduated ERP limits of section 90.723(d).¹⁴³
- PTC-220 must comply with the geographic separation/graduated ERP limits of section 90.723(d) to site a transmitter within 25-200 kHz and between 0.3 and 6 kilometers of a non-nationwide Phase I receiver.
- PTC-220 must obtain the concurrence of a licensee to site a transmitter within 25 kHz and between 0.3 and 6 kilometers of an existing nationwide Phase I or Phase II receiver, and must comply with the geographic separation/graduated ERP limits of section 90.723(d).
- PTC-220 must comply with the geographic separation/graduated ERP limits of section 90.723(d) to site a transmitter within 25-200 kHz and between 0.3 and 6 kilometers of an existing nationwide Phase I or Phase II receiver.¹⁴⁴

50. The Bureau also required PTC-220 to limit any increase in the noise floor to ensure the performance of existing nationwide Phase I and Phase II receivers, within 25 kHz and between 6 and 10 kilometers of a proposed PTC transmitter, as follows:

- PTC-220 must provide a licensee an engineering study showing that degradation of the noise floor from the proposed transmitter at a potential victim site will be 2dB or less.
- If the degradation in the noise floor is greater than 2dB, PTC-220 may not operate the proposed transmitter unless it receives concurrence from the affected licensee.
- If a licensee believes it would suffer interference, despite PTC-220 meeting the 2dB

¹⁴⁰ The license call signs include: WPOI710 (Boston); WPOI774 (Memphis); WPOI800 (St. Louis); WPOI924 (Philadelphia); WPOJ279 (Rochester, MN); WPOJ280 (Minneapolis); WPOJ281 (San Francisco); and WPVL860 (Los Angeles).

¹⁴¹ *2015 Waiver Order*, 30 FCC Rcd at 2287-88, paras. 22-25.

¹⁴² *Id.* at 2288, para. 24.

¹⁴³ 47 CFR § 90.723(d).

¹⁴⁴ *2015 Waiver Order*, 30 FCC Rcd at 2288, para. 25.

requirement, PTC-220 must coordinate further.¹⁴⁵

51. We will require deployments of additional rail safety systems under the modified rule waiver to comply with the foregoing geographic and spectral separation requirements, and noise floor limits. This will reduce the possibility that base station operations could cause interference to adjacent channel licensees in the upper 221-222 MHz band segment.

(iii) Prior Notification Condition

52. In the *2015 Waiver Order*, the Bureau also sought to ensure that 220 MHz Band licensees have sufficient time to consider PTC-220's proposed waiver-enabled transmitter operations. It provided that before operating a new waiver-enabled transmitter or an existing waiver-enabled transmitter with increased height or power, PTC-220 must notify all 220 MHz Band licensees within 200 kHz and 20 kilometers of a proposed transmitter.¹⁴⁶ The notice must:

- specify the proposed transmitter's operating parameters, including site location, frequencies, antenna height, and power;
- include a point of contact with the address, email address, and phone number, to address any concerns regarding potential interference; and
- be concurrently transmitted by mail and email to the licensee, to the licensee contact and, if different, to the licensee's FCC Registration Number contact.¹⁴⁷

53. The Bureau provided that PTC-220 may begin operating a waiver-enabled transmitter 30 days after the date it transmits the required notice, unless a recipient seeks further information to address concerns regarding potential interference.¹⁴⁸ The Bureau also sought to address time-sensitive situations, and stated it would allow PTC-220 "to begin operating a transmitter before 30 days have passed, provided it obtains the affirmative concurrence of all notice recipients that they consent to operation of a transmitter before 30 days have passed."¹⁴⁹

54. We seek to ensure that 220 MHz Band licensees have sufficient time to consider PTC-220's proposed waiver-enabled deployments of additional rail safety systems. Therefore, we will require PTC-220 to comply with the foregoing prior notification requirements when deploying additional rail safety systems under the modified waiver of section 90.729(b)'s power and antenna height limits.

b. Section 90.723(f), Coordination Requirements

55. PTC-220 requests that we modify its waiver of section 90.723(f), which requires Phase II licensees with base or fixed stations transmitting on frequencies in sub-band B (220.8025-220.9975 MHz) of the lower 220-221 MHz band segment, and Phase II licensees with base or fixed stations receiving on sub-band A (221.0025-221.1975 MHz) of the upper 221-222 MHz band segment to coordinate the location of stations to avoid interference where the transmitting and receiving frequencies are 200 kHz or less apart.¹⁵⁰ The underlying purpose of section 90.723(f)'s general coordination requirement is "to protect licensees from co- and adjacent channel interference,"¹⁵¹ by "ensur[ing] that appropriate

¹⁴⁵ *Id.* at 2289, para. 27.

¹⁴⁶ *Id.*, para. 29.

¹⁴⁷ *Id.*

¹⁴⁸ *Id.*, para. 30.

¹⁴⁹ *Id.*

¹⁵⁰ 47 CFR § 90.723(f); Waiver Modification Request at 13-14.

¹⁵¹ See *2015 Waiver Order*, 30 FCC Rcd at 2291, para. 36.

geographic separations are maintained” among licensees deploying in sub-bands A and B.¹⁵²

56. As explained above, in the *2015 Waiver Order*, the Bureau required PTC-220 to meet specific geographic and spectral spacing requirements as a condition of deploying transmitters with increased power and antenna height in the upper 221-222 MHz band segment.¹⁵³ The Bureau agreed with PTC-220 that these “spacing requirements should generally obviate the need for PTC-220 to coordinate the location of base stations pursuant to [s]ection 90.723(f).”¹⁵⁴ However, to “preserve the rights of potentially affected licensees,” the Bureau required PTC-220 to provide at least 30 days’ prior written notice of a planned waiver-enabled transmitter to Phase II licensees, within 200 kHz and 20 kilometers of a proposed transmitter, that would otherwise be covered by section 90.723(f)’s coordination requirements.¹⁵⁵

57. *Compliance with Section 90.173(b)*. Also in the *2015 Waiver Order*, the Bureau noted that section 90.723(f) requires licensees to cooperate to resolve any instances of interference pursuant to section 90.173(b), and found that the public interest would be served by requiring PTC-220 to comply with section 90.173(b).¹⁵⁶ The rule requires licensees to “cooperate in the selection and use of frequencies in order to reduce interference and make the most effective use of the authorized facilities.”¹⁵⁷ The rule states that “[l]icensees of stations suffering or causing harmful interference are expected to cooperate and resolve this problem by mutually satisfactory arrangements.”¹⁵⁸ Under the rule, where licensees are unable to cooperatively resolve interference concerns, “the Commission may impose restrictions including specifying the transmitter power, antenna height, or area or hours of operation of the stations concerned.”¹⁵⁹

58. We find that, under the first prong of the Commission’s section 1.925(b)(3) waiver standard, expanding the scope of the previously granted waiver of section 90.723(f)’s coordination requirements will serve the public interest in rail safety and spectrum efficiency by facilitating the deployment of additional rail safety applications in the 220 MHz Band, and that the underlying purpose of the rule—to limit interference—would not be served by strict application here.¹⁶⁰ Consistent with the *2015 Waiver Order* and to ensure that potentially affected licensees have sufficient time to consider the impact of transmitters using increased height or power under a waiver of section 90.729(b), we will require PTC-220 to provide at least 30 days’ prior written notice of a planned deployment of a waiver-enabled transmitter to Phase II licensees, within 200 kHz and 20 kilometers of a proposed transmitter, that would otherwise be covered by section 90.723(f)’s coordination requirements. The notice must be delivered by the means, and include the information, specified above.¹⁶¹

¹⁵² *Amendment of Part 90 of the Commission’s Rules to Provide for the Use of the 220-222 MHz Band by the Private Land Mobile Radio Service*, PR Docket No. 89-552, Memorandum Opinion and Order on Reconsideration, 13 FCC Rcd 14569, 14617, para. 100 (1998).

¹⁵³ See *2015 Waiver Order*, 30 FCC Rcd at 2287-89, paras. 22-27.

¹⁵⁴ *Id.* at 2291, para. 36.

¹⁵⁵ *Id.*

¹⁵⁶ *Id.*, para. 37.

¹⁵⁷ 47 CFR § 90.173(b).

¹⁵⁸ *Id.*

¹⁵⁹ *Id.*

¹⁶⁰ 47 CFR § 1.925(b)(3)(i). The Appendix to this Order lists the licenses subject to today’s modification of the section 90.723(f) rule waiver.

¹⁶¹ See *supra* para. 52. We remind PTC-220 that under section 90.173(b), it must “cooperate in the selection and use of frequencies in order to reduce interference and make the most effective use of the authorized facilities.” 47 CFR § 90.173(b).

3. Enhanced Interference Mitigation Procedures

59. PTC-220 does not seek any changes to the existing rule waivers' technical parameters under which the railroads' 220 MHz Band PTC network currently operates.¹⁶² PTC-220 states that it expects no increased likelihood of harmful interference from deployment of non-PTC rail safety systems in the 220 MHz Band.¹⁶³ However, to address any interference-related concerns from expanded operations in the 220 MHz Band, PTC-220 states that it is willing to follow the enhanced interference mitigation procedures that the Commission adopted when it granted PTC-220 a waiver of certain rules to enable deployment of PTC and other rail safety systems using PTC-220's adjacent AMTS Band spectrum.¹⁶⁴

60. Consistent with that commitment and as a condition of today's modification of the six rule waivers, we will require that PTC-220 do the following:

- prior to commencing service, establish and maintain a 24-hour helpdesk to receive reports of potential interference;
- provide each potentially affected licensee contact information to report possible interference to the helpdesk;
- provide a party reporting interference a unique tracking number for each interference report;
- investigate any reported interference within 30 calendar days of receiving a report; and
- resolve any interference caused by its operations at its own expense within 60 calendar days of receiving an interference report.¹⁶⁵

Railroads leasing spectrum from PTC-220 to deploy non-PTC rail safety applications must also comply with these conditions.¹⁶⁶

4. Historic Preservation, Environmental, and Related Requirements

61. To comply with their obligations under the Rail Safety Act to implement interoperable PTC systems, U.S. freight railroads had to deploy more than 20,000 wayside poles (vertical structures used to support fixed wireless antennas) along their rights-of-way—every one to three miles—subject to the PTC mandate.¹⁶⁷ In 2014, the Bureau announced that the Advisory Council on Historic Preservation (ACHP)¹⁶⁸ had adopted the *PTC Program Comment* to help expedite the deployment of PTC wayside poles.¹⁶⁹ The *PTC Program Comment* provides the Commission an alternative way to comply with its

¹⁶² Waiver Modification Request Supplement at 3.

¹⁶³ Polivka Declaration at 12, para. 27 (noting that “[b]ecause PTC-220 is not seeking any changes to the technical parameters under which the railroads’ 220 MHz band network currently operates, there is no reason to expect an increased likelihood of harmful interference”).

¹⁶⁴ Waiver Modification Request Supplement at 8 (stating that “[b]ecause PTC-220’s waiver modification request for its 220 MHz band licenses seeks the same treatment as its 219 MHz band licenses, PTC-220 is willing to commit to the 219 MHz band interference mitigation procedures [] for its 220 MHz band licenses”).

¹⁶⁵ *2021 AMTS Waiver Order*, 2021 WL 6135309, *14, para. 52.

¹⁶⁶ PTC-220 is responsible for resolving any inference caused by tenant railroads (such as Amtrak), which use its 220 MHz spectrum for non-PTC rail safety applications on lines controlled by PTC-220.

¹⁶⁷ Waiver Modification Request Supplement at 8.

¹⁶⁸ The ACHP is an independent federal agency that promotes the preservation, enhancement, and productive use of the nation's historic resources, and advises the President and Congress on national historic preservation policy. ACHP, *Mission Statement*, <https://www.achp.gov/about> (last visited Jan. 26, 2023).

¹⁶⁹ *Wireless Telecommunications Bureau Announces Adoption of Program Comment to Govern Review of Positive Train Control Wayside Facilities*, WT Docket No. 13-240, Public Notice, 29 FCC Rcd 5340 (WTB 2014)

responsibilities under section 106 of the National Historic Preservation Act (NHPA),¹⁷⁰ regarding the possible effects of PTC wayside poles and associated infrastructure on historic properties.¹⁷¹

62. The *PTC Program Comment* only applies to: (1) “PTC wayside poles that are no taller than 75 feet (including their antenna) located within existing railroad rights-of-way”; and (2) “PTC wayside pole associated equipment cabinets and other supporting infrastructure (including collocated antennas) also located within existing railroad rights-of-way.”¹⁷² Given the scope of the *PTC Program Comment*, as PTC-220 acknowledges, it may not avail itself of the *PTC Program Comment* when deploying non-PTC wayside poles or supporting infrastructure.¹⁷³

63. We emphasize that today’s waiver relief does not relieve PTC-220 of its obligations to comply with the Commission’s rules implementing the National Environmental Policy Act of 1969 (NEPA),¹⁷⁴ the NHPA,¹⁷⁵ and other applicable laws.¹⁷⁶ Similarly, PTC-220 must comply with the Commission’s tower siting requirements.¹⁷⁷

IV. CONCLUSION AND ORDERING CLAUSES

64. Today’s action will further the public interest by enabling PTC-220’s seven member railroads, their tenants, and the many railroads that lease spectrum from PTC-220 to deploy an array of innovative rail safety systems across the country using PTC-220’s extensive 220 MHz Band spectrum holdings. We emphasize that today’s expanded waiver relief is limited to the deployment of additional

(announcing “Program Comment to Tailor the Federal Communications Commission’s Section 106 Review for Undertakings Involving the Construction of Positive Train Control Wayside Poles and Infrastructure”) (*PTC Program Comment*).

¹⁷⁰ 54 U.S.C. § 306108 (formerly 16 U.S.C. § 470f).

¹⁷¹ The *PTC Program Comment* generally does not require the Commission to consider the effects on historic properties of: (1) most PTC wayside poles and infrastructure within 500 feet of certain existing structures; (2) most collocations of PTC wayside antennas on existing railroad infrastructure; and (3) most PTC wayside poles and infrastructure within freight yards. *See generally PTC Program Comment*. The *PTC Program Comment* “also relieves other federal agencies from the need to conduct separate Section 106 reviews regarding the effects of [PTC wayside] poles and infrastructure.” *Id.*, 29 FCC Rcd at 5344.

¹⁷² *Id.* at 5346-47, Section III.

¹⁷³ PTC-220 states that its Waiver Modification Request “should not be construed as a request to expand the *PTC Program Comment* to non-PTC railroad safety infrastructure that is presently not covered.” Waiver Modification Request Supplement at 9.

¹⁷⁴ 42 U.S.C. §§ 4321–4335; 47 CFR §§ 1.1301-1.1320. *See also* 47 CFR § 17.4(c).

¹⁷⁵ 54 U.S.C. § 300101 et seq.; *Nationwide Programmatic Agreement for the Collocation of Wireless Antennas*, 47 CFR pt. 1, Appx. B.; *Nationwide Programmatic Agreement for Review of Effects on Historic Properties for Certain Undertakings Approved by the Federal Communications Commission*, 47 CFR pt. 1, Appx. C. The Commission provides its Tower Construction Notification System (TCNS) as a tool for applicants to help facilitate communication with Indian Tribes and Native Hawaiian Organizations (NHOs) which enables the review required by section 106 of the NHPA. The TCNS also provides Tribes/NHOs and State Historic Preservation Officers with early notification of proposed towers to facilitate compliance with the Commission’s rules and streamline the review process for construction of towers and other Commission undertakings.

¹⁷⁶ The Commission must comply, for example, with the Endangered Species Act (16 U.S.C. § 1531 *et seq.*), and PTC-220 must comply with the Commission’s implementing regulations when deploying wireless communications infrastructure. *See* 47 CFR § 1.1307(a)(3). Section 1.1307 of the Commission’s rules requires applicants, including licensees and tower owners, to submit an environmental assessment if the proposed facilities might have a significant environmental effect. 47 CFR § 1.1307.

¹⁷⁷ For example, antenna structures that require notice to the Federal Aviation Administration due to physical obstruction must be registered in the Commission’s Antenna Structure Registration system prior to construction. 47 CFR §§ 17.4(a), 17.7.

rail safety systems.¹⁷⁸ Moreover, to ensure that today’s waiver relief does not impact current and possible future PTC deployments, we will require PTC-220 to afford PTC operations the highest priority on its 220 MHz Band spectrum.¹⁷⁹

65. Accordingly, IT IS ORDERED, pursuant to sections 1, 4(i), 4 (j), 5(c), and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. §§ 151, 154(i), 154(j), 155(c), and 303(r), and sections 0.331, 1.3, and 1.925 of the Commission’s rules, 47 CFR §§ 0.331, 1.3, and 1.925, that the Request for Waiver filed by PTC-220, LLC on March 23, 2022, as supplemented by letter dated September 9, 2022—File Nos. 0009965899 (WQSK949), 0009965921 (WQXK673), 0009966558 (WQXK674), 0009966588 (WRJC621), 0009966636 (WRHX600), 0009966711 (WRHX599), 0009966751 (WPWY753), 0009966768 (WPFR284), 0009966783 (WPPF444), 0009966805 (WPOI701), 0009966809 (WREY457), 0009966816 (WREY456), 0009966819 (WRCS461), 0009966838 (WRCS460), 0009966889 (WRCS459), 0009966898 (WQSL327), 0009966910 (WQSL326), 0009966953 (WQSJ981), 0009966992 (WPOI774), 0009967013 (WPVL860), 0009967024 (WPOJ281), 0009967038 (WPOJ280), 0009967046 (WPOJ279), 0009967067 (WPOJ271), 0009967079 (WPOI924), 0009967085 (WPOI800), 0009967092 (WPOI774), 0009967105 (WPOI701), 0009967348 (WPOI705), 0009967355 (WPOI708), 0009967359 (WPOI706), 0009967369 (WPOI704), 0009967375 (WPOI703), 0009967387 (WPOI702), 0010183520 (WQXL586), 0010183541 (WRRCR206), and 0010183542 (WPOI710)—IS HEREBY GRANTED to the extent provided and subject to all conditions enumerated above.¹⁸⁰

FEDERAL COMMUNICATIONS COMMISSION

Roger S. Noel
Chief, Mobility Division
Wireless Telecommunications Bureau

¹⁷⁸ See Waiver Modification Request at 15, n.55 (stating that “PTC-220’s request would not extend to applications wholly unrelated to rail safety [such as] retail commercial broadband service to consumers”).

¹⁷⁹ See *supra* Section III.A.

¹⁸⁰ AAR leases spectrum to PTC-220 under WPOI702 (L000032846), WPOI703 (L000032847), WPOI704 (L000032848), WPOI705 (L000032849), WPOI706 (L000032850), and WPOI708 (L000032851).

APPENDIX

Modified Rule Waivers*

1. 0009965899 (WQSK949; NW): 1, 2, 3, 4
2. 0009965921 (WQXK673; REAG): 2, 3, 4, 5
3. 0009966558 (WQXK674; NW): 2, 3, 4
4. 0009966588 (WRJC621; REAG): 2, 3, 4, 5
5. 0009966636 (WRHX600; REAG): 2, 3, 4, 5
6. 0009966711 (WRHX599; REAG): 2, 3, 4, 5
7. 0009966751 (WPWY753; NW): 1, 2, 3, 4, 5
8. 0009966768 (WPFR284; NW): 1, 2, 3, 4, 5
9. 0009966783 (WPF444; NW): 1, 2, 3, 4, 5
10. 0009966805 (WREY458; REAG): 2, 3, 4, 5
11. 0009966809 (WREY457; REAG): 2, 3, 4, 5
12. 0009966816 (WREY456; REAG): 2, 3, 4, 5
13. 0009966819 (WRCS461; REAG): 2, 3, 4, 5
14. 0009966838 (WRCS460; REAG): 2, 3, 4, 5
15. 0009966889 (WRCS459 NW): 2, 3, 4
16. 0009966898 (WQSL327; REAG): 2, 3, 4, 5
17. 0009966910 (WQSL326; NW): 2, 3, 4,
18. 0009966953 (WQSJ981; REAG): 2, 3, 4, 5
19. 0009966992 (WQSJ980; NW): 2, 3, 4
20. 0009967013 (WPVL860; BEA): 2, 3, 4, 5
21. 0009967024 (WPOJ281; BEA): 2, 3, 4, 5
22. 0009967038 (WPOJ280; BEA): 2, 3, 4, 5
23. 0009967046 (WPOJ279; BEA): 2, 3, 4, 5
24. 0009967067 (WPOJ271; NW): 2, 3, 4, 5
25. 0009967079 (WPOI924; BEA): 2, 3, 4, 5
26. 0009967085 (WPOI800; BEA): 2, 3, 4, 5
27. 0009967092 (WPOI774; BEA): 2, 3, 4, 5
28. 0009967105 (WPOI701; NW): 2, 3, 4, 5
29. 0009967348 (WPOI705; REAG) (AAR/Spectrum Lease): 2, 3, 4, 5
30. 0009967355 (WPOI708; REAG) (AAR/Spectrum Lease): 2, 3, 4, 5
31. 0009967359 (WPOI706; REAG) (AAR/Spectrum Lease): 2, 3, 4, 5
32. 0009967369 (WPOI704; REAG) (AAR/Spectrum Lease): 2, 3, 4, 5
33. 0009967375 (WPOI703; REAG) (AAR/Spectrum Lease): 2, 3, 4, 5
34. 0009967387 (WPOI702; REAG) (AAR/Spectrum Lease): 2, 3, 4, 5
35. 0010183520 (WQXL586; NW): 1, 2, 3, 4
36. 0010183541 (WRCR206; NW): 1, 2, 3, 4
37. 0010183542 (WPOI710; BEA): 2, 3, 4, 5

License Key: Basic Economic Area (BEA); Nationwide (NW); Regional Economic Area Grouping (REAG).

***Rule Key:** (1) 47 CFR §§ 90.713(a) and 90.717(b) (Commercial-Use Restrictions); (2) 47 CFR § 90.715 (Base/Mobile Band Configuration); (3) 47 CFR § 90.735(a) (Station Identification); (4) 47 CFR § 90.729(b) (Upper 221-222 MHz Band Segment Power/Antenna Height Limits); (5) 47 CFR § 90.723(f) (Coordination Requirements).