

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

In the Matter of)
PTC-220, LLC) File Nos. 0008962547, 0008962575,
For Modification of Licenses for) 0008962578, and 0008962604
Automated Maritime Telecommunications System)
Stations WRDI936, WRDH825, WRDH826, and)
WRDH972)

ORDER

Adopted: December 27, 2021

Released: December 27, 2021

By the Chief, Mobility Division, Wireless Telecommunications Bureau:

I. INTRODUCTION.

1. The Mobility Division (Division) of the Wireless Telecommunications Bureau (Bureau) hereby grants four License Modification Applications¹ filed by PTC-220, LLC (PTC-220)—a joint venture of the nation’s seven Class I freight railroads²—for permanent authority to operate 2,265 positive train control (PTC) wireless radio base stations, 16,108 PTC wireless radio wayside stations,³ and related mobile (locomotive) radio stations under Automated Maritime Telecommunications System (AMTS) Call Signs WRDI936, WRDH825, WRDH826, WRDH972, AMTS Regions 2, 4, 5, and 6, respectively.⁴ For

¹ ULS File Nos. 0008962547, 0008962575, 0008962578, and 0008962604 (filed Jan. 31, 2020, amended Feb. 4 and 7, 2020, and Nov. 4 and 8, 2021). PTC-220 further amended File No. 0008962547 on December 1, 2021.

² PTC-220’s 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. ULS File Nos. 0008962547, 0008962575, 0008962578, and 0008962604, Revised Request for Waivers for AMTS Spectrum at 2, n.3 (filed Nov. 4, 2021) (Waiver Request).

³ Base stations typically operate at antenna heights of 50 to 175 feet above ground level (AGL) and at effective radiated power (ERP) levels ranging from 100 to 400 watts. ULS File No. 0008962547, “Engineering Study Report and Plan to Limit Interference from AMTS Stations to Over-the Air Reception of TV Channels 13 and 10, Covering WRDH972 (AMTS Region 6)” at 8, dated Dec. 1, 2021 (filed Dec. 1, 2021) (Region 6 Engineering Report). Wayside stations are radio sites at intermediate or control point railroad signals and have a typical antenna height of 30 to 60 feet AGL. Id. They communicate with approaching locomotives and nearby base stations at ERP levels up to 76 watts. Id.

⁴ PTC-220 has operated PTC base, wayside, and mobile stations under a grant of special temporary authority (STA) in the four license areas using this spectrum for over a year and has received no reports of interference. Waiver Request at 14-15 (STA Call Signs WRFA943 (Region 2), WRFA941 (Region 4) WRFA701 (Region 5), and WRFA703 (Region 6)). The AMTS rules define two station classes: coast stations and ship stations. 47 CFR § 80.5 (defining a coast station as a “land station in the maritime mobile service” and a ship station as a “mobile station in the maritime mobile service located on-board a vessel which is not permanently moored”). The Commission amended the AMTS rules in 1997 to permit AMTS stations to serve fixed, mobile, and handheld units on land, in addition to marine vessels. Amendment of the Commission’s Rules Concerning Maritime Communications, PR Docket No. 92-257, Second Report and Order and Second Further Notice of Proposed Rule

(continued....)

the reasons discussed below, we also grant PTC-220's request for waiver of certain Commission rules to facilitate PTC deployment in the four regional AMTS license areas.⁵

2. Today's action will enable PTC-220's seven member railroads to deploy Congressionally-mandated, interoperable PTC safety systems on rail lines serving 31 states and the District of Columbia.⁶ Today's action also will benefit Amtrak and other railroads that operate as tenants on the members' railroad networks as well as passenger and commuter railroads leasing spectrum from PTC-220 to implement PTC on their own lines in the four license areas.⁷ This grant of permanent (non-STA) operating authority is subject to certain conditions adopted below.

II. BACKGROUND

3. 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, passenger, and commuter railroads to install and operate interoperable PTC systems by December 31, 2018.⁸ Four railroads timely met this deadline.⁹ As the Rail Safety Act permits, the remaining railroads subject to the PTC mandate, including PTC-220's member railroads, requested up to a 2-year extension, until December 31, 2020, to implement PTC.¹⁰ The FRA found that these railroads met the statutory criteria necessary to qualify for an extended implementation schedule and, subsequently, that they met their extended deadlines.¹¹

4. 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."¹² The U.S. rail industry has chosen 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

Making, 12 FCC Red 16949, 16964-65 paras. 24-25 (1997). Because they are both fixed stations, we regulate PTC base and wayside stations as AMTS coast stations for licensing purposes. And because they are mobile, we regulate locomotive stations as AMTS ship stations for licensing purposes.

⁵ Waiver Request, Appendix A.

⁶ The states include: Delaware, District of Columbia, Maryland, North Carolina, Pennsylvania, South Carolina, Virginia, and West Virginia in AMTS Region 2; Alabama, Arkansas, Illinois, Iowa, Indiana, Kansas, Kentucky, Louisiana, Minnesota, Mississippi, Missouri, Nebraska, North Dakota, Ohio, Oklahoma, Pennsylvania, South Dakota, Tennessee, Texas, Virginia, West Virginia, and Wisconsin in AMTS Region 4; Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin in AMTS Region 5; and Arizona, California, and Oregon in AMTS Region 6. ULS File Nos. 0008962604, 0008962578, 0008962575, and 0008962547, Schedule D PTC Site Data (filed Nov. 4, 2021)

⁷ Waiver Request at 4-5.

⁸ *Rail Safety Improvement Act of 2008*, Pub. L. No. 110-432, § 104, 122 Stat. 4848, 4857 (2008), amended by the *Positive Train Control Enforcement and Implementation Act of 2015*, Pub. L. No. 114-73, § 1302, 129 Stat. 568, 576 (2015). The Federal Railroad Administration (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. Positive Train Control (PTC) Information (R&D), Federal Railroad Administration (last updated Nov. 13, 2019), <https://www.fra.dot.gov/Page/P0152> (last visited Dec. 3, 2021).

⁹ Statement on Positive Train Control Implementation, U.S. Department of Transportation (last updated Dec. 31, 2018), <https://www.transportation.gov/briefing-room/statement-positive-train-control-implementation> (last visited Dec. 3, 2021).

¹⁰ *Id.*

¹¹ Positive Train Control (PTC), U.S. Department of Transportation (last updated Jan. 4, 2021), <https://railroads.dot.gov/train-control/ptc/positive-train-control-ptc> (last visited Dec. 3, 2021).

¹² 49 U.S.C. § 20157(i)(5).

office” applications, regarding train movement authorities, speed restrictions, train position and speed, and the state of signal and switch devices.

5. Spectrum Acquisition and Authorizations. PTC-220 was formed to acquire and manage the necessary spectrum resources for its seven freight railroad members to implement PTC systems throughout the United States.¹³ PTC-220 has acquired a nationwide footprint of 220 MHz spectrum for its members and other railroads, including commuter railroads, to deploy PTC.¹⁴ However, the need for its members to deploy two additional PTC common channels—which locomotive radios use to attach to PTC base stations and receive instructions regarding the proper frequency to operate on in an area—and the lack of additional suitable 220 MHz spectrum drove PTC-220’s acquisition of 500 kilohertz of immediately adjacent AMTS spectrum (from 219.5 to 220 MHz).¹⁵

6. On February 15, 2019, Choctaw Holdings, LLC (Choctaw) and PTC-220 filed applications to disaggregate and assign AMTS spectrum from four Choctaw Call Signs (WQGF315, WQGF316, WQGHF317, and WQGF318) to PTC-220.¹⁶ On February 20, 2019, the Bureau placed the applications on public notice.¹⁷ The Division consented to the applications on April 1, 2019.¹⁸ And on April 26, 2019, PTC-220 consummated the assignments, resulting in the issuance of new Call Signs WRDI936,¹⁹ WRDH825, WRDH826, WRDH972 for AMTS Regions 2 (Mid-Atlantic), 4 (Mississippi River), 5 (Great Lakes), and 6 (Southern Pacific), respectively.²⁰

7. PTC-220 also acquired AMTS spectrum from Thomas K. Kurian to deploy PTC on rail lines serving 16 western states in AMTS Region 10 (Mountain).²¹ In the order consenting to that assignment, the Division granted PTC-220 a waiver of several Part 80 rules to enable its members’ PTC

¹³ Waiver Request at 2.

¹⁴ *Id.* at 4. PTC-220 holds 31 separate 220 MHz licenses. *Id.* at n.10.

¹⁵ *Id.* at 3-4.

¹⁶ ULS File Nos. 0008527475 (WQGF315), 0008530247 (WQGF316), 0008527617 (WQGF317), and 0008527687 (WQGF318) (filed Feb. 15, 2019).

¹⁷ *Wireless Telecommunications Bureau Assignment of License Authorization Applications, Transfer of Control of Licensee Applications, and De Facto Transfer Lease Applications, and Designated Entity Reportable Eligibility Event Applications Accepted for Filing*, Public Notice, Report No. 13854 (WTB rel. Feb. 20, 2019), 2019 WL 857616.

¹⁸ *Wireless Telecommunications Bureau Assignment of License Authorization Applications, Transfer of Control of Licensee Applications, De Facto Transfer Lease Applications and Spectrum Manager Lease Notifications, Designated Entity Reportable Eligibility Event Applications, and Designated Entity Annual Reports Action*, Public Notice, Report No. 13947 (WTB Apr. 1, 2019), 2019 WL 1752504.

¹⁹ *Wireless Telecommunications Bureau Assignment of License Authorization Applications, Transfer of Control of Licensee Applications, De Facto Transfer Lease Applications and Spectrum Manager Lease Notifications, Designated Entity Reportable Eligibility Event Applications, and Designated Entity Annual Reports Action*, Public Notice, Report No. 14061 (WTB May 15, 2019), 2019 WL 2137216. ULS File No. 0008618619 (WRDI936), Notice of Consummation (filed Apr. 26, 2019).

²⁰ *Wireless Telecommunications Bureau Assignment of License Authorization Applications, Transfer of Control of Licensee Applications, De Facto Transfer Lease Applications and Spectrum Manager Lease Notifications, Designated Entity Reportable Eligibility Event Applications, and Designated Entity Annual Reports Action*, Public Notice, Report No. 14047 (WTB May 8, 2019), 2019 WL 2052363. ULS File Nos. 0008618658 (WRDH825), 0008618639 (WRDH826), and 0008618654 (WRDH972), Notices of Consummation (filed Apr. 26, 2019).

²¹ *Application of Thomas K. Kurian, For Partitioning and Disaggregation of License for Automated Maritime Telecommunications System Station WQCP809 to PTC-220, LLC*, Order, DA 20-1391, 2020 WL 6955421 (WTB MD 2020) (*Region 10 Order*).

deployment.²² PTC-220 seeks a waiver of the same rules here.²³ The Division recently granted PTC-220 permanent authority to deploy 547 PTC base stations and 5,566 PTC wayside stations in AMTS Region 10.²⁴

8. In the short term, PTC-220's member railroads will use the AMTS spectrum to implement two additional PTC common channels, which will improve system reliability and safety.²⁵ In the longer term, the railroads will leverage the spectrum to: (1) expand PTC deployment onto non-mandatory lines; (2) support other, related train control safety applications, including End-of-Train devices and distributed power systems; and (3) support future safety-related functions, such as improvements to the monitoring of grade crossing equipment.²⁶

9. Special Temporary Authorizations. PTC-220 is currently deploying PTC for testing purposes under STA Call Signs WRFA943 (Region 2), WRFA941 (Region 4), WRFA701 (Region 5), and WRFA703 (Region 6), using the same spectrum and in the same geographic areas for which it requests permanent operating authority.²⁷ PTC-220 states that it has received no reports of interference related to these PTC operations.²⁸

10. License Modification Applications. Although AMTS geographic licensees generally are authorized to deploy base stations anywhere within their licensed geographic service areas, section 80.215(h)(2) of the Commission's rules requires individual licensing of base stations located less than 169 kilometers (105 miles) from a channel 13 TV station, or less than 129 kilometers (80 miles) from a channel 10 TV station.²⁹ PTC-220 seeks to modify its geographic area licenses to individually authorize, on a permanent (non-STA) basis and subject to the applicable license terms, operation of 2,265 PTC base stations and 16,108 PTC wayside stations.³⁰

11. PTC-220 Engineering Studies. PTC-220 conducted two engineering studies;³¹ one study supports its application to modify Call Sign WRDH972 (AMTS Region 6),³² and a second, consolidated study, supports its applications to modify Call Signs WRDI936 (AMTS Region 2), WRDH825 (AMTS

²² *Id.* at paras. 25-37.

²³ Waiver Request.

²⁴ *PTC-220 LLC, Call Sign WRKK374*, Letter Order, DA 21-1556 (WTB MD rel. Dec.14, 2021) (*Region 10 Modification Order*).

²⁵ Waiver Request at 3.

²⁶ *Id.* at 5-7.

²⁷ *Id.* at 14-15.

²⁸ *Id.*

²⁹ 47 CFR § 80.215(h)(2); *see also id.* § 80.475(a)(1). AMTS base stations are authorized "subject to the condition that no harmful interference will be caused to television reception except that TV services authorized subsequent to the filing of the AMTS station application will not be protected." *Id.* § 80.215(h).

³⁰ Specifically, PTC-220 seeks authority to operate: 329 base stations and 719 wayside stations under WRDI936; 1,471 base and 11,856 wayside stations under WRDH825; 320 base and 2,261 wayside stations under WRDH826; and 145 base and 1,272 wayside stations under WRDH972. ULS File No. 0008962575, 0008962578, 0008962604, and 0008962547 Request for Waiver of 47 C.F.R. § 1.913(b) and Schedule D Instructions at 2 (filed Nov. 4, 2021) (PTC-220 Schedule D Waiver Request).

³¹ Tom Peters, an engineering consultant to PTC-220, prepared the reports. ULS File Nos. 0008962547, 0008962575, 0008962578, and 0008962604, Engineering Certification of Tom Peters, dated Nov. 3, 2021 (filed Nov. 4, 2021).

³² Region 6 Engineering Report.

Region 4), and WRDH826 (AMTS Region 5).³³ Pursuant to section 80.215(h)(2) of the Commission's rules,³⁴ these studies address the potential number of channel 10 and channel 13 over-the-air (OTA) TV households that could be impacted by operation of PTC-equipped base, wayside, and mobile stations in the license areas. We discuss the studies' findings below.

12. **Interference Mitigation Plan.** As required by section 80.215(h)(2) of the Commission's rules, PTC-220 submitted a plan to limit potential interference from operation of the proposed base and wayside stations to OTA television reception.³⁵ PTC-220 has certified that it, its members, and spectrum lessees will adhere to this plan.³⁶ We discuss the plan below.

13. **PTC-220 Waiver Request.** PTC-220 requests a waiver of several Commission Part 80 rules to enable PTC deployment in the four regional AMTS license areas.³⁷ The Bureau previously waived these same rules to enable PTC deployment in AMTS Region 10.³⁸ For the reasons stated below, we grant the requested rule waivers.

14. **Broadcaster Notifications.** As required by section 80.475(a)(2) of the Commission's rules,³⁹ PTC-220 served written notice of the License Modification Applications on potentially affected broadcast stations on February 3, 2020 and, as amended, on November 8, 2021.⁴⁰ No broadcast station or other party has filed a comment on, or opposed, PTC-220's License Modification Applications.

III. DISCUSSION

15. We have reviewed the License Modification Applications, PTC-220's engineering studies, its Interference Mitigation Plan, and all other filings in the record before us, and find that the public interest in facilitating rail safety will be served by granting PTC-220 permanent authority to operate the 2,265 PTC base stations, 16,108 PTC wayside stations, and related mobile stations.

A. PTC-220 Waiver Request

16. We first address PTC-220's request for waiver of the following Part 80 rules to facilitate its members' deployment of PTC and related rail safety applications in AMTS Regions 2, 4, 5, and 6:

- Section 80.92(a), which requires licensees to monitor a frequency before transmitting;⁴¹
- Section 80.105, which requires coast stations to receive calls from ship and aircraft

³³ ULS File Nos. 0008962575, 0008962578, and 0008962604 "Engineering Study Report and Plan to Limit Interference from AMTS Stations to Over-the Air Reception of TV Channels 13 and 10, Covering WRDI936 (AMTS Region 2), WRDH825 (AMRS Region 4), and WRDH826 (AMTS Region 5)," dated Nov. 3, 2021 (filed Nov. 4, 2021) (Regions 2, 4, and 5 Engineering Report).

³⁴ 47 CFR § 80.215(h)(2).

³⁵ Region 6 Engineering Report at 16-17 (AMTS Region 6 Interference Mitigation Plan); Regions 2, 4, and 5 Engineering Report at 17-18 (AMTS Regions 2, 4, and 5 Interference Mitigation Plan).

³⁶ ULS File No. 0008962547, 0008962575, 0008962578, and 0008962604, Certification of PTC-220, LLC, by Tom Burns, its President, dated Nov. 1, 2021 (filed Nov. 4, 2021) (PTC-220 Burns Certification).

³⁷ Waiver Request, Appendix A.

³⁸ *Region 10 Order; Region 10 Modification Order.*

³⁹ 47 CFR § 80.475(a)(2).

⁴⁰ ULS File Nos. 0008962547, 0008962575, 0008962578, and 0008962604, Certificates of Service (filed Feb. 3, 2020 and Nov. 8, 2021). PTC-220 also served notice of a revision to its AMTS Region 6 Engineering Study on December 1, 2021. ULS File No. 0008962547, Certificate of Service (filed Dec. 1, 2021).

⁴¹ 47 CFR § 80.92(a).

stations;⁴²

- Section 80.106, which requires a coast station to receive communications from mobile stations and to transmit communications delivered to it, which are directed to mobile stations;⁴³
- Section 80.123(a), which requires an AMTS land station to secure a letter authorizing the land station to communicate with a coast station;⁴⁴
- Section 80.123(b), which requires coast stations to afford priority to marine-originating communications;⁴⁵
- Section 80.123(f), which provides that AMTS land stations may only communicate with coast stations;⁴⁶
- Section 80.215(h)(5), which requires coast stations' transmitter power, as measured at the input terminals to the station antenna, to be 50 watts or less;⁴⁷ and
- Section 80.385(a)(2), which divides the AMTS spectrum band into coast (base) station frequencies (217-218 MHz) and ship (mobile) station frequencies (219-220 MHz).⁴⁸

17. The Bureau waived these same rules to enable PTC-220 to deploy PTC and related rail safety applications in AMTS Region 10,⁴⁹ which borders PTC-220's Regions 4 and 6 license areas to the east and west, respectively. The Bureau also waived these same rules to enable the Southern California Regional Rail Authority (SCRRA) and its three tenant railroads—Amtrak, the BNSF Railway, and the Union Pacific Railroad—to deploy PTC in an area partitioned from AMTS Region 6 that adjoins PTC-220's AMTS Region 6 license area.⁵⁰ The Bureau also waived these rules to enable Amtrak to deploy PTC using AMTS spectrum in the Northeast Rail Corridor (from New York to Washington DC).⁵¹ The Bureau's reasoning for waiving the rules to enable PTC in those orders applies equally here.

18. Waiver Standard. Section 1.925(b)(3) of the Commission's Rules provides that we may grant a waiver if it is shown that (i) the underlying purpose of the rule(s) would not be served or would be frustrated by application to the instant case, and grant of the requested waiver would be in the public interest; or (ii) in light of unique or unusual circumstances, application of the rule(s) would be inequitable, unduly burdensome, or contrary to the public interest, or the applicant has no reasonable alternative.⁵²

⁴² *Id.* § 80.105.

⁴³ *Id.* § 80.106.

⁴⁴ *Id.* § 80.123(a).

⁴⁵ *Id.* § 80.123(b).

⁴⁶ *Id.* § 80.123(f).

⁴⁷ *Id.* § 80.215(h)(5).

⁴⁸ *Id.* § 80.385(a)(2).

⁴⁹ *Region 10 Order*, 35 FCC Rcd at 13114-16, paras. 30-35.

⁵⁰ *Maritime Communications/Land Mobile, LLC and Southern California Regional Rail Authority File Applications to Modify License and Assign Spectrum for Positive Train Control Use, and Request Part 80 Waivers*, WT Docket No. 10-83, Order, 31 FCC Rcd 9826 (WTB 2016) (*SCRRA Waiver Order*).

⁵¹ *National Railroad Passenger Corporation (d/b/a Amtrak), Request for Waiver of Certain Part 80 Automated Maritime Telecommunications System Rules to Implement Positive Train Control*, Order, 30 FCC Rcd 2038 (WTB MD 2015) (*Amtrak Part 80 Waiver Order*).

⁵² 47 CFR § 1.925(b)(3); *see also* *WAIT Radio v FCC*, 418 F. 2d 1153, 1159 (D.C. Cir. 1969).

The Commission also may waive a rule, in whole or in part, on its own motion or on petition for good cause.⁵³

19. Further, when the Commission amended its rules to permit AMTS stations to provide service to units on land, it stated that the following factors would be considered in evaluating requests for waiver of AMTS rules: (a) whether the applicant will provide priority to maritime communications; (b) the distance of a proposed land mobile radio operation from the nearest navigable waterways; (c) the magnitude of divergence sought from specific Part 80 technical requirements; (d) whether alternative spectrum that could accommodate the proposed private land mobile radio (PLMR) or other land mobile radio service is unavailable or unsuitable for that purpose; and (e) whether grant of the waiver would benefit public safety or homeland security (including support of critical infrastructure).⁵⁴

20. Section 80.92(a). Section 80.92(a) requires an AMTS station operator to determine that a frequency is not in use before transmitting.⁵⁵ PTC-220 states that while this rule is “necessary for a shared public system like AMTS, the rule is unnecessary for PTC systems,”⁵⁶ which operate on an exclusive-use basis. In the *Region 10 Order*, the Bureau found that waiving the requirement to monitor before transmitting would “promote the efficient use of AMTS spectrum and serve the public interest by promoting rail safety.”⁵⁷ Consistent with that order and because railroads are deploying PTC in defined rail corridors, we find that the purpose of the rule (to avoid interference) would not be served here, and that grant of the requested waiver would be in the public interest by promoting rail safety and the efficient use of AMTS spectrum.⁵⁸

21. Section 80.105 and Section 80.123(b). PTC-220 requests waiver of the requirements that AMTS licensees receive calls from ship stations (section 80.105),⁵⁹ and that they afford priority to marine communications (section 80.123(b)).⁶⁰ In the *SCRRA Waiver Order*, the Bureau stated that a waiver of section 80.105 was required to enable “necessary intercommunication between the various PTC system elements,”⁶¹ and that the rule’s application would impair “PTC operation by interrupting critical information flow.”⁶² We note that maritime users have many options to meet their communications needs in the four license areas, including cellular and satellite services, and find that waiver of sections 80.105 and 80.123(b) to enable PTC deployment will not jeopardize the maritime community’s ability to meet its operational, safety, and security communications needs. We also find that, considering the unique circumstances of PTC deployments, strict application of sections 80.105 and 80.123(b) to PTC operations

⁵³ 47 CFR § 1.3.

⁵⁴ *Maritel, Inc. and Mobex Network Services, LLC*, Report and Order, 22 FCC Rcd 8971, 8986-87, para. 26 (2007) (*Flexibility Order*).

⁵⁵ 47 CFR § 80.92(a).

⁵⁶ Waiver Request at 9.

⁵⁷ *Region 10 Order*, 35 FCC Rcd at 13114, para. 30 (quoting *Amtrak Part 80 Waiver Order*, 30 FCC Rcd at 2041, para. 11).

⁵⁸ 47 CFR § 1.925(b)(3)(i).

⁵⁹ Waiver Request at 9, citing 47 CFR § 80.105.

⁶⁰ *Id.* at 11, citing 47 CFR § 80.123(b).

⁶¹ *SCRRA Waiver Order*, 31 FCC Rcd at 9837, para. 31 & n.106, citing Letter from Joseph C. Szabo, Administrator, Federal Railroad Administration, to Ruth Milkman, Chief, Wireless Telecommunications Bureau, FCC, WT Docket No. 10-83, at 2 (May 3, 2010).

⁶² *Id.*

would be contrary to the public interest in rail safety and accordingly waive these rules.⁶³

22. Section 80.106. PTC-220 requests a waiver of the requirement that an AMTS coast station receive communications from mobile stations (that is, ship and aircraft stations at sea) and transmit communications delivered to it that are directed to mobile stations (section 80.106).⁶⁴ In the *Region 10 Order* and in the *Amtrak Part 80 Waiver Order*, the Bureau waived section 80.106 to enable the rails' PTC deployment when it waived section 80.105's requirement that coast stations acknowledge and receive calls from mobile stations.⁶⁵ Consistent with these orders, we find that waiving section 80.106 here will promote the efficient use of AMTS spectrum and serve the public interest by improving the safety of railroad operations, without jeopardizing the maritime community's ability to meet its communications needs.⁶⁶ We find that considering the unique circumstances of U.S. railroads' PTC deployments, application of section 80.106 to their PTC operations would be contrary to the public interest in rail safety and therefore waive this rule.⁶⁷

23. Section 80.123(a). PTC-220 requests a waiver of the requirement that AMTS land stations secure a letter authorizing the land station to communicate with a coast station (section 80.123(a)),⁶⁸ which enables authorities to verify that a unit on land is authorized to operate on AMTS spectrum.⁶⁹ PTC-220 notes that the Bureau previously waived this rule to enable Amtrak and SCRRRA to deploy PTC using AMTS spectrum.⁷⁰ In the *Amtrak Part 80 Waiver Order*, the Bureau found that because PTC "is configured to transmit only data[] and railroad operations take place in limited locations where the responsible party is easily identifiable,"⁷¹ waiver would be appropriate. And in the *SCRRRA Order*, the Bureau found that the "unique circumstances . . . in complying with the federal PTC mandate" supported a finding that "application of Section 80.123(a) . . . is unnecessary and would be unduly burdensome."⁷² We find that consistent with these orders and the *Region 10 Order*⁷³ and considering the unique circumstances U.S. railroads face in complying with the federal PTC mandate, application of section 80.123(a) to their PTC operations is unnecessary and would be unduly burdensome and therefore waive this rule.⁷⁴

24. Section 80.123(f). PTC-220 seeks a waiver of the requirement that AMTS land stations only communicate with coast stations (section 80.123(f)),⁷⁵ noting that in the *SCRRRA Order*, the Bureau

⁶³ 47 CFR § 1.925(b)(3)(ii). See also *County of Silverbow, Montana*, Order, 24 FCC Rcd 12547, 12565, para. 41 (PSHSB PD 2009) (*Silverbow Order*) (waiving section 80.105 to permit use of VHF Public Coast station frequencies in a Public Safety PLMR system).

⁶⁴ Waiver Request at 9-10, citing 47 CFR § 80.106.

⁶⁵ *Region 10 Order*, 35 FCC Rcd at 13115, para. 32; *Amtrak Part 80 Waiver Order*, 30 FCC Rcd at 2042, para. 13.

⁶⁶ *Id.*

⁶⁷ 47 CFR § 1.925(b)(3)(ii). See also *Silverbow Order*, 24 FCC Rcd at 12565, para. 41 (waiving section 80.106 to permit use of VHF Public Coast station frequencies in a Public Safety PLMR system).

⁶⁸ 47 CFR § 80.123(a).

⁶⁹ Waiver Request at 10-11.

⁷⁰ *Id.* at 10, citing *Amtrak Part 80 Waiver Order*, 30 FCC Rcd at 2042, para. 12. and *SCRRRA Waiver Order*, 31 FCC Rcd at 9838, para. 34.

⁷¹ *Amtrak Part 80 Waiver Order*, 30 FCC Rcd at 2042, para. 12.

⁷² *SCRRRA Waiver Order*, 31 FCC Rcd at 9838, para. 34.

⁷³ *Region 10 Order*, 35 FCC Rcd at 13115-16, para. 33 (waiving section 80.123(b)).

⁷⁴ 47 CFR § 1.925(b)(3)(ii).

⁷⁵ *Id.* § 80.123(f).

found that this operational standard is unnecessary for a private, internal-use only PTC system,⁷⁶ and that the Bureau granted Amtrak a waiver of this requirement to enable its PTC deployment on AMTS spectrum.⁷⁷ Consistent with these orders and the *Region 10 Order*,⁷⁸ and in light of the unique circumstances U.S. railroads face in complying with the federal PTC mandate, we find that application of section 80.123(f) to their PTC operations would be contrary to the public interest in rail safety and accordingly waive this rule.⁷⁹

25. Section 80.385(a)(2). PTC-220 requests waiver of section 80.385(a)(2),⁸⁰ which divides the AMTS spectrum band into coast (base) station frequencies (217-218 MHz) and ship (mobile) station frequencies (219-220 MHz).⁸¹ PTC-220 notes that PTC systems rely on Time Division Duplexing (TDD) transmit/receive time slot separation, and that PTC base, wayside, and mobile stations will need to transmit on both the base and mobile station frequencies.⁸² When the Bureau granted Amtrak and SCRRRA a waiver of this requirement, it noted that they would operate subject to the antenna height and radiated power levels permitted for AMTS stations in their limited geographic area of operations.⁸³ In the *Region 10 Order*, the Bureau concluded that “[b]ecause PTC-220’s member railroads’ PTC operations likewise will be in limited geographic areas and subject to the same restrictions,” a waiver of section 80.385(a)(2) is warranted.⁸⁴ We find that, considering the unique circumstances U.S. railroads face in complying with the federal PTC mandate, strict application of section 80.385(a)(2) to their PTC operations would be contrary to the public interest and accordingly waive this rule.⁸⁵

26. Section 80.215(h)(5). Finally, PTC-220 requests a limited waiver of section 80.215(h)(5), which requires coast stations’ “transmitter power, as measured at the input terminals to the station antenna, [to] be 50 watts or less.”⁸⁶ PTC-220 states that thousands of existing PTC base stations have a transmitter power output of 75 watts peak envelope power (PEP) or less.⁸⁷ It explains that because these stations have at least 0.6 dB of cable, connector, and filter insertion loss between a transmitter’s output and an antenna’s input terminals, power at the input terminals will not exceed 65 watts PEP.⁸⁸ PTC-220 therefore requests a waiver of section 80.215(h)(5) to permit up to 65 watts PEP as measured at the input terminals to a station antenna.

27. As PTC-220 explains, power at the input to antenna terminals alone does not determine whether a PTC transmitter has the potential to interfere with other licensees’ operations; rather, the level

⁷⁶ Waiver Request at 11 and n.50, citing *SCRRRA Waiver Order*, 31 FCC Rcd at 9839, para 36.

⁷⁷ *Id.*, citing *Amtrak Part 80 Waiver Order*, 30 FCC Rcd at 2042, para. 13.

⁷⁸ *Region 10 Order*, 35 FCC Rcd at 13116, para. 34 (waiving section 80.123(f)).

⁷⁹ 47 CFR § 1.925(b)(3)(ii).

⁸⁰ *Id.* § 80.385(a)(2).

⁸¹ Waiver Request at 11-12.

⁸² *Id.*

⁸³ *Amtrak Part 80 Waiver Order*, 30 FCC Rcd at 2042-43, para. 14; *SCRRRA Waiver Order*, 31 FCC Rcd at 9839, para. 37.

⁸⁴ *Region 10 Order*, 35 FCC Rcd at 13116, para. 35.

⁸⁵ 47 CFR § 1.925(b)(3)(ii).

⁸⁶ Waiver Request at 13, citing 47 CFR § 80.215(h)(5).

⁸⁷ *Id.* at 13.

⁸⁸ *Id.*

of radiated power from an antenna determines interference potential.⁸⁹ PTC-220 states that because PTC base stations generally use omnidirectional (or nearly omnidirectional) antennas, most of an antenna's gain results from focusing the power in the vertical plane.⁹⁰ PTC-220 states that larger antennas could produce more gain so that the same radiated power levels could be achieved with 50 watts at an antenna's input terminal.⁹¹ But to achieve these power levels while adhering to section 80.215(h)(5)'s 50-watt limit, railroads would have to install new, lower power transmitters and new antennas at thousands of base station sites.⁹² Under these circumstances, we find that strict application of section 80.215(h)(5) to railroads' PTC operations is unnecessary and would be unduly burdensome.⁹³ We also find that considering the unique circumstances U.S. railroads face in complying with the federal PTC mandate, strict application of section 80.215(h)(5) to their PTC operations would be contrary to the public interest and accordingly waive this rule to permit operations at up to 65 watts PEP as measured at the input terminals to a base station antenna.⁹⁴

B. Authorization of Wireless Mobile (Locomotive) Radio Stations.

28. PTC-220 requests authorization to operate PTC locomotive radios at up to 50 watts transmitter power output (TPO)⁹⁵ with an effective radiated power (ERP) up to 39 watts under Call Signs WRDI936, WRDH825, WRDH826, and WRDH972.⁹⁶ The Bureau granted PTC-220 identical relief to enable its members, their tenant railroads, and Amtrak to implement PTC using AMTS spectrum in AMTS Region 10 (Mountain).⁹⁷ It also granted the Southern California Regional Rail Authority (SCRRA) the same relief to enable SCRRA and its three tenants railroads—Amtrak, and PTC-220 members the BNSF Railway and the Union Pacific Railroad—to implement PTC using AMTS spectrum in a partitioned license area abutting PTC-220's AMTS Region 6 license area.⁹⁸

29. Section 80.215(i) of the Commission's rules provides that AMTS mobile radio stations (here, locomotive radios) must have a TPO "not exceeding 25 watts and an ERP not exceeding 18 watts."⁹⁹ The rule permits increased TPO, up to 50 watts, provided two conditions are met: (1) "[i]ncreases exceeding 25 watts are made only by radio command from the controlling [base] stations,"¹⁰⁰ and (2) TPO "is 25 watts or less when external radio commands are not present."¹⁰¹ Section 80.215(j) provides that mobile radio stations that meet both these conditions are "exempted from the limitation of 18 watts ERP when operating in specific geographical areas identified in a plan for the use of higher

⁸⁹ *Id.* (noting "it is the gain of the antenna and the input power that determine the magnitude, direction and breadth of the radiated power, but ultimately only radiated power can cause interference").

⁹⁰ *Id.*

⁹¹ *Id.*

⁹² *Id.*

⁹³ 47 CFR § 1.925(b)(3)(ii).

⁹⁴ *Id.* § 1.925(b)(3)(ii).

⁹⁵ TPO is the power level at the output terminals of a radio transmitter.

⁹⁶ Waiver Request at 13-15. ERP is defined as "[t]he product of the power supplied to the antenna multiplied by the gain of the antenna referenced to a half-wave dipole." 47 CFR § 1.907.

⁹⁷ *Region 10 Modification Order.*

⁹⁸ *Southern California Regional Rail Authority, Call Sign WQYR421*, Letter Order, DA 20-1259, 35 FCC Rcd 11912, 11917-11921 (WTB MD 2020).

⁹⁹ 47 CFR § 80.215(i).

¹⁰⁰ *Id.* § 80.215(i)(1).

¹⁰¹ *Id.* § 80.215(i)(2).

power.”¹⁰² PTC-220 seeks a waiver of the two conditions in sections 80.215(i)(1) and (2) (which it cannot meet for technical reasons) so that its members may operate locomotive radios at up to 50 watts TPO with an ERP up to 39 watts.¹⁰³ We grant PTC-220’s request for the reasons that follow.

30. Mobile Radio Transmitter Power Output Limit. 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.¹⁰⁴ To comply with this statutory interoperability requirement, PTC-220’s member railroads have deployed an integrated PTC system, which uses a combination of their base and wayside radio stations operating on 220-222 MHz band spectrum.¹⁰⁵ Due to a shortage of available 220-222 MHz band spectrum for PTC deployment, PTC-220 has created a common pool of PTC spectrum channels drawn from 220-222 MHz Band spectrum and from adjacent band AMTS spectrum licensed to PTC-220.¹⁰⁶ PTC-220 explains that to implement interoperable PTC systems that can use channels drawn from the common spectrum pool, it requires a limited waiver of section 80.215(i)’s power limits.¹⁰⁷

31. PTC-220’s seven member railroads and their tenant railroad partners have deployed more than 16,000 Meteorcomm PTC locomotive radios across the country,¹⁰⁸ using the spectrum PTC-220 holds in the 220-222 MHz band. Consistent with applicable Part 90 rules,¹⁰⁹ the railroads configured their mobile radios to operate at a constant 50-watt TPO in the 220-222 MHz band.¹¹⁰ PTC-220 states that these “locomotive radios do not have the ability to have their power dynamically controlled by” base stations.¹¹¹ Instead, adjustment of a radio’s TPO “would require that a technician manually connect to the radio to program in the new value.”¹¹² PTC-220 explains that “[a]s a result, the radio’s power is not variable as it moves from one base station’s coverage to another’s.”¹¹³

32. We find that in view of the unique and unusual circumstances here, including Congress’ mandate that PTC safety systems be interoperable, application of the two conditions required to operate mobile radio transmitters at up to 50 watts TPO in the AMTS band—(1) that TPO increases exceeding 25 watts are made only by base station radio command,¹¹⁴ and (2) that TPO must be 25 watts or less when

¹⁰² *Id.* § 80.215(j). PTC-220 filed a consolidated plan for AMTS Regions 2, 4, and 5. ULS File Nos. 0008962604, 0008962578, and 0008962575, Section 80.215(j) Plan for Use of Higher Mobile Power (filed Nov. 4, 2021) (AMTS Regions 2, 4, and 5 Section 80.215(j) Plan) (filed Nov. 4, 2021). PTC-220 filed a separate plan for AMTS Region 6. ULS File No. 0008962547, Section 80.215(j) Plan for Use of Higher Mobile Power (filed Nov. 4, 2021) (AMTS Region 6 Section 80.215(j) Plan). We refer to the two plans as the Section 80.215(j) Plans.

¹⁰³ Waiver Request at 14-15.

¹⁰⁴ 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).

¹⁰⁵ Waiver Request at 15.

¹⁰⁶ *Id.*

¹⁰⁷ *Id.*

¹⁰⁸ *Id.* at 14. The radio’s specifications are attached as Exhibit 1 to PTC-220’s Section 80.215(j) Plans.

¹⁰⁹ 47 CFR § 90.729(b).

¹¹⁰ Waiver Request at 15.

¹¹¹ *Id.* at 14.

¹¹² *Id.*

¹¹³ *Id.*

¹¹⁴ *Id.* § 80.215(i)(1).

external radio commands are not present¹¹⁵—would be contrary to the public interest in the safety of life and property. Second, we find that not permitting PTC-220’s member railroads to operate mobile radios at 50 watts TPO would be contrary to the public interest because it would preclude sharing of scarce spectrum resources, which are needed for robust interoperable PTC deployment throughout the country. Third, we find that PTC-220 has no reasonable alternative. PTC-220’s member railroads have installed more than 16,000 locomotive radios that operate at a constant 50 watts TPO in the 220-222 MHz band; the record shows that it is not possible to program the radios to operate at 50 watts TPO and satisfy the condition that TPO be 25 watts or less when external radio commands are not present.

33. Given the totality of the circumstances in the record before us and for the reasons stated above, we hereby waive sections 80.215(i)(1) and (2) of the Commission’s rules to the extent necessary and authorize PTC-220 to operate PTC locomotive radios at 50 watts TPO under Call Signs WRDI936, WRDH825, WRDH826, and WRDH972.¹¹⁶

34. Mobile Radio Effective Radiated Power Limits. PTC-220 also requests waiver of section 80.215(i)’s 18-watt mobile radio ERP limit so that its members can operate PTC locomotive radios at up to 39 watts ERP.¹¹⁷ As explained above, although section 80.215(i) generally limits mobile radio ERP to 18 watts,¹¹⁸ section 80.215(j) exempts mobile radio operations from this ERP limit provided the two conditions for exceeding section 80.215(i)’s 25-watt TPO limit are met “when operating in specific geographical areas identified in a plan for the use of higher power.”¹¹⁹

35. Pursuant to section 80.215(j), PTC-220 has submitted a plan to deploy mobile radios with a peak ERP from 24 to 39 watts in specific geographical areas of Regions 2, 4, and 5 and a separate plan for Region 6.¹²⁰ Each plan includes maps of the specific rail lines where PTC mobile radios will operate¹²¹ and a showing regarding the radios’ peak ERP levels.¹²² PTC-220 explains that no appreciable additional interference would result from operation of the mobile radios because their transmit duty cycle is extremely low, their antennas are much lower to the ground than base and wayside station antennas, and they operate at much lower power levels.¹²³

36. Above we waive the two conditions of section 80.215(i) required to use mobile radios with TPO exceeding 25 watts ERP. Once these two conditions are met (or waived, as here), a licensee is exempt from the rule’s 18-watt ERP limit, provided it has submitted an appropriate plan for use of higher mobile power under section 80.215(j). We have closely reviewed PTC-220’s Section 80.215(j) Plans and find that the plans meet the requirements for exemption of mobile radio operations from section 80.215(i)’s 18-watt ERP limit. Accordingly, we hereby authorize PTC-220 to operate mobile radios at up

¹¹⁵ *Id.* § 80.215(i)(2).

¹¹⁶ This waiver extends to all locomotive radio operations under the four call signs.

¹¹⁷ Depending on their configuration, PTC-220’s member railroads’ locomotive radios operate from 24 to 39 watts ERP. Section 80.215(j) Plans at 2.

¹¹⁸ 47 CFR § 80.215(i).

¹¹⁹ *Id.* § 80.215(j).

¹²⁰ Section 80.215(j) Plans.

¹²¹ The maps are attached to PTC-220’s Section 80.215(j) Plans.

¹²² Section 80.215(j) Plans at 1-2.

¹²³ Section 80.215(j) Plans at 4 (mobile radios’ 30% duty cycle is rarely met; the manufacturer estimates they typically transmit less than one percent of the time). *Id.* (mobile radio antennas are mounted on the top of locomotives from 17-19 feet AGL, while wayside antennas are mounted at 60-80 feet AGL and base station antennas at 150 or more AGL). AMTS Region 6 Engineering Report at 8-9 (the power of wayside stations (up to 76 watts ERP) and base stations (up to 400 watts ERP) is typically much greater than mobiles (up to 39 watts ERP)).

to 39 watts ERP under Call Signs WRDI936, WRDH82, WRDH826, and WRDH972.¹²⁴

C. Authorization of Wireless Radio Base and Wayside Stations

37. We now address PTC-220's request for authorization to operate 2,265 wireless radio base and 16,108 wayside stations.

38. Request for Waiver of 47 CFR § 1.913(b). We first address PTC-220's request to provide PTC base and wayside radio station data in a consolidated format. Pursuant to sections 1.3 and 1.925(b)(3)(ii) of the Commission's rules,¹²⁵ PTC-220 requests that we waive section 1.913(b) of the Commission's rules to the extent the rule would require PTC-220 to file a separate FCC Form 601, Schedule D for authorization of each of the more than 18,000 fixed radio stations.¹²⁶ PTC-220 states that the number of required PTC base and wayside radio stations included in its License Modification Applications present unique factual circumstances that would render the requirement to complete a Schedule D for each station unduly burdensome and contrary to the public interest within the meaning of section 1.925(b)(3)(ii).¹²⁷

39. PTC-220 requests permission to present the information required by Schedule D by a spreadsheet (attached to each application).¹²⁸ The spreadsheets provide location and other pertinent station parameters in a user-friendly format that can be analyzed by interested parties and FCC staff, rather than having to parse over 18,000 Schedule D filings.¹²⁹ We find that Congress' PTC mandate and the application of section 1.913(b)—to the extent it would require PTC-220 to file over 18,000 Schedule Ds to comply with that mandate—present unique factual circumstances and that it would be contrary to the public interest to require strict adherence to the rule.¹³⁰ For these reasons, we grant PTC-220's waiver request.

40. Interference Analysis. PTC-220 submitted a consolidated engineering study for AMTS Regions 2, 4, and 5,¹³¹ which are geographically contiguous, and a second study for AMTS Region 6.¹³² As required by section 80.215(h)(2) of the Commission's rules,¹³³ the engineering studies address the potential for interference from the proposed operation of PTC base and wayside radio stations to over-the-air (OTA) channel 10 and 13 receivers.

¹²⁴ This waiver extends to all locomotive radio operations under the four call signs.

¹²⁵ 47 CFR § 1.3 (the Commission can waive any provision of its rules "for good cause shown"); *id.* § 1.925(b)(3)(ii).

¹²⁶ PTC-220 Schedule D Waiver Request at 1-2. Section 1.913(b) requires that "associated schedules . . . be filed electronically in accordance with the electronic filing instructions provided by ULS." 47 CFR § 1.913(b). Schedule D is titled "Wireless Telecommunications Bureau and/or Public Safety and Homeland Security Bureau Schedule for Station Locations and Antenna Structures." The Schedule D filing instructions state "[t]his schedule must be completed when any station location is to be added, modified, or deleted." FCC Form 601, Schedule D – Instructions, at 1 (Mar. 2018). And that an applicant must "[u]se as many copies of Schedule D as necessary to provide information for all stations." *Id.*

¹²⁷ PTC-220 Schedule D Waiver Request at 1; 47 CFR § 1.925(b)(3)(ii).

¹²⁸ PTC-220 Schedule D Waiver Request at 2.

¹²⁹ ULS File Nos. 0008962547, 0008962575, 0008962578, and 0008962604, Schedule D PTC Site Data (filed Nov. 4, 2021).

¹³⁰ 47 CFR § 1.925(b)(3)(ii).

¹³¹ Regions 2, 4, and 5 Engineering Report.

¹³² Region 6 Engineering Report.

¹³³ 47 CFR § 80.215(h)(2).

1. Channel 10 Broadcast Stations.

41. PTC-220 identified all full power, Class A, and LPTV stations that transmit on channel 10 within 129 kilometers (80 miles) of a PTC site in the four license areas.¹³⁴ Section 80.215(h)(1) of the Commission's rules requires applicants seeking to operate in the AMTS band to submit interference mitigation plans addressing the potential for interference to TV channel 10.¹³⁵ The Commission adopted this rule, which was intended to protect analog TV channel 10 receivers from intermodulation interference, before the digital television transition; however, the transition from analog to digital television has resulted in a lack of criteria to assess the potential for interference to digital channel 10 receivers.

42. OET-74 Supplement A states that “to assert compliance with the protection and mitigation requirements in [section 80.215(h)] regarding potential interference to channel 10, PTC applicants intending to operate in the AMTS band should briefly explain [1] that the transition to digital TV results in a lack of criteria to assess potential interference to channel 10, [2] that harmful interference to TV Channel 10 is unlikely, and [3] that if such interference is caused by PTC operations, it will be cured at the applicant's expense.”¹³⁶

43. PTC-220 excluded channel 10 digital stations from its interference analyses.¹³⁷ Consistent with the requirements of OET-74 Supplement A, PTC-220 states that “the transition [from analog] to digital TV results in a lack of criteria to assess potential interference to digital transmissions on channel 10,”¹³⁸ and that the threat of harmful interference to digital channel 10 broadcast is not likely.¹³⁹ Further, PTC-220 acknowledges that it is responsible for curing any interference to viewers of OTA channel 10 television stations at its own expense.¹⁴⁰ We therefore find that PTC-220 properly excluded channel 10 digital stations from its interference analyses.¹⁴¹

44. We emphasize that if a railroad's operations under Call Signs WRDI936, WRDH825, WRDH826, or WRDH972 were to interfere with OTA reception of a channel 10 station, the railroad must remediate such interference at its own expense as required by section 80.215(h)(4)¹⁴² and the interference mitigation conditions we adopt below.

¹³⁴ Regions 2, 4, and 5 Engineering Report, Appendix D; Region 6 Engineering Report, Appendix D.

¹³⁵ 47 CFR § 80.215(h)(1).

¹³⁶ Longley-Rice Methodology for Predicting Inter-Service Interference to Broadcast Television from Mobile Wireless Broadband Services in the UHF Band, Supplement A – Guidance for Predicting Inter-Service Interference to Broadcast Television in the VHF Band from Positive Train Control (PTC) Systems, OET Bulletin No. 74, Supplement A at 5 (2017), <https://transition.fcc.gov/oet/info/documents/bulletins/oet74/OET74a-PTC.pdf> (OET-74 Supplement A).

¹³⁷ Appendix D to the PTC-220 Engineering Reports identifies channel 10 stations within 129 kilometers of a PTC site in the license area.

¹³⁸ Regions 2, 4, and 5 Engineering Report at 22; Region 6 Engineering Report at 20.

¹³⁹ *Id.*

¹⁴⁰ *Id.*

¹⁴¹ All analog LPTV stations were required to cease operations on July 13, 2021, therefore, none were included in PTC-220's studies. AMTS Regions 2, 4, and 5 Engineering Report at 22, n.47; AMTS Region 6 Engineering Report at 20, n.49. See *Media Bureau Reminds Low Power Television and Television Translator Stations that the July 13, 2021, Digital Transition Date and Other Important Deadlines Are One Week Away*, Public Notice, DA No. 21-786, 2021 WL 2827304 (F.C.C.) (MB rel. July 6, 2021) (reminding LPTV stations that they must discontinue analog service by July 13, 2021).

¹⁴² 47 CFR § 80.215(h)(4).

2. Channel 13 Broadcast Stations.

45. PTC-220's AMTS Regions 2, 4, and 5 Engineering Report identifies 36 full power and 15 digital low power channel 13 stations within 169 kilometers (105 miles) of a PTC site.¹⁴³ And its AMTS Region 6 Engineering Report identifies five full power and eight digital low power channel 13 stations within 169 kilometers (105 miles) of a PTC site.¹⁴⁴

46. PTC-220 used the Commission's TVStudy software to determine the potential for the proposed PTC operations to interfere with channel 13 broadcast stations.¹⁴⁵ Using TV Study, it applied the Longley-Rice radio propagation model¹⁴⁶ to predict the number of television households that potentially could be affected by the operation of the proposed radio stations.¹⁴⁷ PTC-220 states that, consistent with OET-74 and OET-74 Supplement A, it calculated the number of potentially affected channel 13 households using a threshold desired/undesired (D/U) signal ratio of -33 dB.¹⁴⁸ PTC-220 used a matrix of square tiles—two kilometers per side for full power channel 13 stations and one kilometer per side for LPTV channel 13 stations—to identify the tiles with insufficient D/U ratio inside a television station's service area and the number of potential households within those tiles that potentially could be affected by the proposed PTC operations.¹⁴⁹

47. Section 80.215(h)(3) of the Commission's rules provides for authorization of a fixed AMTS station where a licensee shows that fewer than 100 households would be impacted by its operation.¹⁵⁰ However, a license must satisfy three requirements to obtain authorization of a station that potentially would impact more than 100 households.¹⁵¹ Rather than providing data for each fixed station, PTC-220 chose to aggregate the data for all stations.¹⁵² PTC-220 predicts that, before undertaking interference mitigation, the aggregate transmissions of all PTC stations in Regions 2, 4, and 5 have the potential to affect 704,749 channel 13 TV households (2.5% of all households).¹⁵³ PTC-220 predicts that, before undertaking interference mitigation, the aggregate transmissions of all PTC stations in Region 6

¹⁴³ Regions 2, 4, and 5 Engineering Report at 4-6. *Id.* at 5, Fig. 2 (Full Power Channel 13 Stations); and at 6, Fig. 3 (LPTV Channel 13 Stations).

¹⁴⁴ Region 6 Engineering Report at 4-6. *Id.* at 5, Fig. 2 (Full Power Channel 13 Stations); and at 6, Fig. 3 (Digital LPTV Channel 13 Stations).

¹⁴⁵ Regions 2, 4, and 5 Engineering Report at 4-5; Region 6 Engineering Report at 4-6.

¹⁴⁶ Longley-Rice Methodology for Evaluating TV Service Coverage and Interference, OET Bulletin No. 69 (2004), <https://transition.fcc.gov/oet/info/documents/bulletins/oet69/oet69.pdf> (OET-69); Longley-Rice Methodology for Predicting Inter-Service Interference to Broadcast Television from Mobile Wireless Broadband Services in the UHF Band, OET Bulletin No. 74 (2015), <https://www.fcc.gov/bureaus/oet/info/documents/bulletins/oet74/OET74.pdf> (OET-74).

¹⁴⁷ PTC-220's study methodology included nine steps. Regions 2, 4, and 5 Engineering Report at 11-12; Region 6 Engineering Report at 12-13.

¹⁴⁸ Regions 2, 4, and 5 Engineering Report at 13; Region 6 Engineering Report at 14.

¹⁴⁹ Regions 2, 4, and 5 Engineering Report at 11; Region 6 Engineering Report at 11.

¹⁵⁰ 47 CFR § 80.215(h)(3).

¹⁵¹ *Id.*

¹⁵² Regions 2, 4, and 5 Engineering Report at 13-17; Region 6 Engineering Report at 13-16.

¹⁵³ Regions 2, 4, and 5 Engineering Report at 14-16. *Id.* at 15, Tab. 1 (Full Power DTV Households Affected by PTC-220's PTC Operations in AMTS Regions 2, 4, and 5); and at 16, Tab. 2 (LPTV Households Affected by PTC-220's PTC Operations in AMTS Regions 2, 4, and 5).

have the potential to affect 207,381 channel 13 TV households (2.1% of all households).¹⁵⁴ Given this aggregation, to analyze the potential impact on channel 13 TV households, we will assume for this specific analysis that each PTC base and wayside station in the four license areas has the potential to impact more than 100 channel 13 TV households.

48. Under section 80.215(h)(3)(i)-(iii) of the Commission's rules, the Commission may approve a fixed AMTS station where 100 or more households are within the interference contour of that station and a television station's analog Grade B contour (here, PTC-220 used the TV stations' noise-limited service contours),¹⁵⁵ provided the applicant: (1) shows that the proposed site is the only suitable location (at the application stage, it is sufficient to establish that the site is especially well-suited to provide the proposed service); (2) develops a plan to control any interference caused to TV reception from its operations; and (3) agrees to make adjustments to TV receivers to eliminate interference caused by its operations.¹⁵⁶ We find that PTC-220 has satisfied the three requirements of section 80.215(h)(3)(i)-(iii).

49. First, PTC-220 certifies that, consistent with section 80.215(h)(3)(i), each of the proposed station locations are "especially well-suited to provide the proposed [PTC] service."¹⁵⁷ PTC-220 explains that "[b]ecause the proposed services are designed specifically for communications with trains, the sites must be placed in close proximity to railroad tracks and appropriately spaced to ensure a good quality signal along all segments of the tracks"¹⁵⁸

50. Regarding the second and third requirements under section 80.215(h)(3), PTC-220 has developed a plan to mitigate potential interference (including free installation of notch filters if necessary)¹⁵⁹ for any household experiencing interference to their OTA reception of a channel 13 station, which it predicts would eliminate potential interference to all households.¹⁶⁰ Accordingly, we find that PTC-220 has satisfied the three requirements of section 80.215(h)(3)(i)-(iii) and hereby grant its application for permanent authority to operate the proposed 2,265 base stations and 16,108 wayside stations,¹⁶¹ subject to the interference mitigation conditions we adopt below.

¹⁵⁴ Region 6 Engineering Report at 13-16. *Id.* at 14, Tab. 1 (Full Power DTV Households Affected by PTC-220's PTC Operations in AMTS Region 6); and at 15, Tab. 2 (LPTV Households Affected by PTC-220's PTC Operations in AMTS Region 6).

¹⁵⁵ 47 CFR § 80.215(h)(3). Historically, the Commission analyzed the potential for interference according to a TV station's analog Grade B predicted contour. To account for the conversion to digital television, the Commission developed the noise-limited service contour (NLSC) to approximate the same probability of service as the analog Grade B contour. The NLSC is defined using the F(50,90) field strength contour, the area in which at least fifty percent of the locations can be expected to receive a signal that exceeds a specified field strength value at least ninety percent of the time. *See Establishment of a Model for Predicting Digital Broadcast Television Field Strength Received at Individual Locations*, ET Docket No. 10-152, Notice of Proposed Rule Making and Further Notice of Proposed Rule Making, 25 FCC Rcd 10474, 10485, para. 25 (2010). *See also Avista Corporation*, Order, 27 FCC Rcd 263, 266-67, paras. 6-7 (WTB MD 2012) (Longley-Rice propagation model and NLSC used to predict potential interference to DTV station by AMTS licensee).

¹⁵⁶ 47 CFR § 80.215(h)(3)(i)-(iii).

¹⁵⁷ PTC-220 Burns Certification.

¹⁵⁸ *Id.*

¹⁵⁹ A notch (band reject) filter attenuates one frequency band and passes both a lower and a higher frequency band.

¹⁶⁰ Regions 2, 4, and 5 Engineering Report at 14; Region 6 Engineering Report at 14.

¹⁶¹ ULS File Nos. 0008962604, 0008962578, 0008962575, and 0008962547, Revised Schedule D PTC Site Data for AMTS Regions 2, 4, 5, and 6, respectively (filed Nov. 4, 2021). PTC-220 must comply with the effective radiated power limits and all other conditions enumerated in the Letter of Concurrence from the National Radio Quiet Zone

(continued....)

3. Interference Mitigation Plan and Conditions.

51. Section 80.215(h)(4) of the Commission's rules requires AMTS licensees to eliminate interference from their fixed station operations to viewers' OTA reception of channels 10 and 13.¹⁶² PTC-220's Interference Mitigation Plan describes and establishes a process for PTC-220 to comply with section 80.215(h)(4).¹⁶³ PTC-220 will investigate whether a transmitter owned or controlled by a PTC-220 member is the source of any reported interference.¹⁶⁴ If interference mitigation is required, PTC-220 has committed to resolve the interference by one of three possible measures. First, PTC-220 could change the frequency of the interfering transmitter either to another licensed AMTS frequency or to a frequency in the 220-222 MHz band on spectrum licensed to PTC-220.¹⁶⁵ Second, if a frequency change is not feasible, PTC-220 could modify the RF configuration of the site (*e.g.*, ERP, orientation, or tilt).¹⁶⁶ Third, if interference were to persist despite the foregoing measures or if such measures are impractical, then PTC-220 would provide free of charge, TV notch filters to affected viewers, which it predicts would eliminate interference caused to any affected TV receiver.¹⁶⁷ The filters have a minimum notch depth of 40 (+/-1) dB.¹⁶⁸ According to PTC-220, application of these filters "will result in zero households experiencing interference" in the four regional license areas.¹⁶⁹

52. Although section 80.214(h)(4) of the Commission's rules provides AMTS licensees up to 90 days to resolve interference issues,¹⁷⁰ PTC-220 has committed to being more responsive and to resolve reports of interference within 60 days of receiving a report.¹⁷¹ Consistent with the foregoing, as a condition of today's grant of permanent authority to operate the 2,265 wireless radio base and 16,108 wayside stations, we require PTC-220 to:

- Establish, prior to commencing the service, and maintain a 24-hour helpdesk to receive reports of potential interference.
- Provide each potentially affected broadcaster contact information to report possible interference to the helpdesk;¹⁷²

Administrator, Paulette W. Woody, to PTC-220, dated November 20, 2019 (NRQZ ID 12167_04SEP2019) and the related notification procedures enumerated in the PTC-220 Letter, dated January 17, 2020, ULS File No. 0008834433.

¹⁶² 47 CFR § 80.215(h)(4).

¹⁶³ Regions 2, 4, and 5 Engineering Report at 17-18; Region 6 Engineering Report at 16-17; PTC-220 Burns Certification (committing PTC-220, its member-owners, and non-member spectrum lessees to implement the interference mitigation measures).

¹⁶⁴ PTC-220 Engineering Report at 20.

¹⁶⁵ Regions 2, 4, and 5 Engineering Report at 18; Region 6 Engineering Report at 16.

¹⁶⁶ *Id.*

¹⁶⁷ Regions 2, 4, and 5 Engineering Report at 18; Region 6 Engineering Report at 17.

¹⁶⁸ *Id.*

¹⁶⁹ Regions 2, 4, and 5 Engineering Report at 19; Region 6 Engineering Report at 17.

¹⁷⁰ 47 CFR § 80.215(h)(4).

¹⁷¹ Regions 2, 4, and 5 Engineering Report at 17; Region 6 Engineering Report at 16. *See also* PTC-220 Burns Certification (committing PTC-220's member-owners to investigating reported interference within 30 days and resolving any interference within 60 days of a report). PTC-220 also states it "will require its non-member spectrum lessees to abide by the same interference resolution timelines." *Id.*

¹⁷² Regions 2, 4, and 5 Engineering Report at 5, Fig. 2 (Full Power Channel 13 Stations), at 6, Fig. 3 (Digital LPTV Channel 13 Stations), and at Appendix D (Channel 10 Stations); Region 6 Engineering Report at 5, Fig. 2 (Full

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- 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.¹⁷³

IV. CONCLUSION

53. For the reasons stated above, we hereby conditionally grant the License Modification Applications and PTC-220's related waiver requests, ULS File Nos. 0008962547, 0008962575, 0008962578, and 0008962604.

54. Action taken pursuant to Sections 1, 4(i), and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. §§ 151, 154(i), and 303(r), and sections 0.331, 1.913(b), 1.925(b)(3), 80.92(a), 80.105, 80.106, 80.123(a), 80.123(b), 80.123(f), 80.215(h)-(j), and 80.385(a)(2) of the Commission's rules, 47 CFR §§ 0.331, 1.913(b), 1.925(b)(3), 80.92(a), 80.105, 80.106, 80.123(a), 80.123(b), 80.123(f), 80.215(h)-(j), and 80.385(a)(2).

Sincerely,

Roger S. Noel
Chief, Mobility Division
Wireless Telecommunications Bureau

Power Channel 13 Stations), at 6, Fig. 3 (Digital LPTV Channel 13 Stations), and at Appendix D (Channel 10 Stations).

¹⁷³ If PTC-220 were unable to remedy interference, Commission rules would require it to discontinue use of an offending base or wayside radio station. 47 CFR § 80.215(h)(4).