

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

In the Matter of)	
)	
Amendment of Part 90 of the)	WT Docket No. 11-69
Commission's Rules to Permit)	
Terrestrial Trunked Radio (TETRA))	
Technology)	
)	
Request by the TETRA Association for)	ET Docket No. 09-234
Waiver of Sections 90.209, 90.210 and)	
2.1043 of the Commission's Rules)	

NOTICE OF PROPOSED RULE MAKING AND ORDER

Adopted: April 18, 2011

Released: April 26, 2011

Comment Date: [45 days after publication in the Federal Register]

Reply Comment Date: [60 days after publication in the Federal Register]

By the Commission:

I. INTRODUCTION

1. In this *Notice of Proposed Rule Making and Order*, we propose to modify our rules to permit the certification and use of Terrestrial Trunked Radio (TETRA) equipment under Part 90 of our Rules.¹ TETRA is a spectrally efficient digital technology with the potential to provide valuable benefits to land mobile radio users. It does not, however, conform to all of our Part 90 technical rules. The TETRA Association (the Association)² filed a request for waiver of the Part 90 occupied bandwidth limit and emission masks, in order to permit implementation of TETRA technology in the United States. For the reasons set forth below, we grant the waiver request in part, to permit certification and use of TETRA equipment, subject to certain conditions, pending the outcome of this rulemaking proceeding.

II. BACKGROUND

2. Subpart I of Part 90 of our Rules sets forth the general technical requirements for use of frequencies and equipment in the private land mobile radio services. Such requirements include standards for acceptability of equipment, frequency tolerance, modulation, emissions, power, and bandwidths.³ The purpose of these technical standards is to limit wireless systems' interference potential.⁴ The Association

¹ 47 C.F.R. Part 90.

² See Request for Waiver of Sections 90.209, 90.210 and 2.1043 (filed November 20, 2009) (Request). The TETRA Association is composed of 150 organizations from 37 countries, and promotes the use of TETRA technology around the world. *Id.* at 2.

³ See 47 C.F.R. § 90.201.

⁴ See Biennial Regulatory Review – Amendment of Parts 1, 22, 24, 27, and 90 to Streamline and Harmonize Various Rules Affecting Wireless Radio Services, *Report and Order and Notice of Proposed Rulemaking*, WT Docket No. 03-264, 20 FCC Rcd 13900, 13923 n.168 (2005).

asserts that, because the Part 90 technical rules were originally developed for analog technology, they are not always appropriate for evaluating more spectrally efficient digital technologies that have been developed.⁵

3. TETRA is a digital, trunked radio technology that operates with Time Division Multiple Access (TDMA) in four-slot channels within a twenty-five kilohertz bandwidth. In 2009, the Association filed a request for waiver of Parts 2 and 90 of the Commission's rules on behalf of manufacturers to allow TETRA technology to be used in the United States. The Association states that the TETRA standard, which was developed by the European Technical Standards Institute (ETSI), is used around the world, and that manufacturers are ready to produce TETRA devices for use in the United States on several frequency bands.⁶ It also states that TETRA technology provides better efficiency and security than available alternatives,⁷ and offers interoperability among equipment from different manufacturers.⁸

4. In order to permit implementation of TETRA technology in the United States, the Association requests waivers of the Part 90 occupied bandwidth limit and emission masks. For devices operating with twenty-five kilohertz channel spacing, Section 90.209(b)(5) of our Rules limits the authorized bandwidth to twenty kilohertz,⁹ and Section 90.210 of our Rules specifies particular emission masks.¹⁰ TETRA equipment, however, exceeds these limits, because the ETSI standard does not set occupied bandwidth limits. Instead, it sets standards for adjacent channel power and for unwanted emissions at different frequency offsets. This results in operation with a bandwidth of up to twenty-two kilohertz,¹¹ and excursions of up to five decibels from the Part 90 emission masks.¹²

5. The Association also requests a waiver of the permissive change rules regarding equipment certification. It notes that certain manufacturers, in order to meet immediate demand for TETRA equipment, have obtained Commission certification of TETRA radios that comply with the Part 90 rules by using reduced power. Certain changes to approved equipment, including changes to the maximum

⁵ See Request at 7.

⁶ See *id.* at 2-3, 10.

⁷ See *id.* at 2-3 (“TETRA utilizes a highly efficient data transport mechanism allowing Short Data messages to be sent on the control circuit. Circuit mode data and IP packet data can be transmitted at up to 36kbits/s (gross) and 28kbits/s (net) for multi-slot operation. . . . Additionally, TETRA-based products come with built-in air interface encryption and optional end-to-end encryption features to protect the integrity of the voice/data mobile communications. Finally, TETRA allows for fast call set-up times of typically less than 300 ms which are essential for mission critical mobile communications. In sum, TETRA combines the advantages of two-way radio, mobile telephony, messaging and data in a way that is clear, fast and less expensive than other technologies.”).

⁸ See *id.* at 3.

⁹ See 47 C.F.R. § 90.209(b)(5).

¹⁰ See 47 C.F.R. § 90.210(b), (c), (g). The emission mask is the technical specification that limits the distribution of power of a radio transmitter as a function of frequency. The Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Agency Communication Requirements Through the Year 2010, *First Report and Order and Third Notice of Proposed Rulemaking*, WT Docket No. 96-86, 14 FCC Rcd 152, 213 n.337 (1998). The emission mask is an important technical parameter that affects the efficient use of a frequency band by limiting emissions from one channel into adjacent channels. 1998 Biennial Regulatory Review - 47 C.F.R. Part 90 - Private Land Mobile Radio Services, *Report and Order and Further Notice of Proposed Rule Making*, WT Docket No. 98-182, 15 FCC Rcd 16673, 16689 ¶ 33 (2000).

¹¹ See Request at 1, 3-5.

¹² See *id.* at 1, 5-7.

power, generally are not allowed without a new equipment certification.¹³ The Association seeks a waiver to allow manufacturers that receive interim equipment authorizations using reduced power to upgrade to the TETRA standard without requiring a new grant of equipment certification.¹⁴

6. The Association argues that it has been demonstrated that TETRA equipment does not to pose an interference threat to other technologies.¹⁵ Consequently, the Association asserts that grant of the waiver request would be consistent with the underlying purpose of the Part 90 technical rules.¹⁶ It also asserts that a waiver would be in the public interest because it would facilitate the rapid implementation in the United States of a low-cost alternative that performs better than currently available technologies.¹⁷

7. The Commission's Office of Engineering and Technology requested comment on the waiver request.¹⁸ Commenters supporting the waiver request argue that it is in the public interest to make TETRA technology available to private wireless users, especially those that must comply with the upcoming narrowbanding requirements.¹⁹ Those opposing the waiver request argue that the Association has not demonstrated that TETRA technology will not cause interference to existing systems, and that the question of whether to permit the use of TETRA technology should be addressed in a rulemaking proceeding rather than in the context of a waiver request.²⁰

III. NOTICE OF PROPOSED RULE MAKING

8. We agree that the general question of whether the Commission should permit the use of TETRA technology on a permanent basis should be considered in a rulemaking proceeding. Therefore, we seek comment on proposed technical rules that would enable digital technologies like TETRA to operate without causing interference to existing systems. We also request comment on how the deployment of TETRA technology may affect public safety interoperability.²¹

¹³ 47 C.F.R. § 2.1043(a).

¹⁴ See Request at 1, 7-8. Other TETRA equipment has achieved compliance using different modulation filters. See PowerTrunk ex parte presentation at 20.

¹⁵ See Request at 8-9.

¹⁶ See *id.*

¹⁷ See *id.* at 2-3, 10.

¹⁸ See Office of Engineering and Technology Declares the TETRA Association's Request for Waiver of Parts [sic] 90.209, 90.210 and 2.1043 to Be a "Permit-But-Disclose" Proceeding for *Ex Parte* Purposes and Requests Comment, *Public Notice*, ET Docket No. 09-234, 24 FCC Rcd 14718 (OET 2009). Fourteen comments and three reply comments were filed. Commenters were split between supporting and opposing the waiver request. Comments in support of the waiver were filed by PMC Associates, Great River Energy, Bay Electronics Inc. (Bay Electronics), Wireless Engineering Systems and Technology (WEST), Sepura PLC (Sepura), and the TETRA Association. Comments in opposition were filed by Motorola Inc. (Motorola), Skybridge Spectrum Foundation and associated parties (Skybridge Parties), the National Public Safety Telecommunications Council (NPSTC), the Land Mobile Communications Council (LMCC), the Association of Public Safety Communications Officials-International Inc. (APCO), the Telecommunications Industry Association (TIA), Harris Corporation (Harris), and Aclara RF Systems Inc. (Aclara). Reply comments were filed by the TETRA Association, Motorola, and the Skybridge Parties.

¹⁹ See, e.g., WEST comments at 1-3; see also 47 C.F.R. § 90.209(b)(5)-(6).

²⁰ See, e.g., LMCC comments at 2-3.

²¹ Part 90 of the Commission's rules defines interoperability as "an essential communication link within public safety and public service wireless communications systems which permits units from two or more different entities (continued....)"

9. *Interference potential.* Some commenters express concern (generally unsupported by any technical analysis) that deployment of TETRA technology could cause harmful interference to existing land mobile systems.²² The Association asserts that TETRA technology provides equal or greater co-channel interference protection than currently available technologies.²³ It submitted a TSB-88 analysis²⁴ comparing the adjacent channel power ratio (ACPR) of a TETRA signal with typical victim receiver characteristics.²⁵ We believe that this analysis is useful in determining the relative interference potential of TETRA devices.²⁶ The analysis indicates that TETRA has a lower interference potential to adjacent channel users than currently used analog FM and Project 25 Phase I transmitters.²⁷ Further, the Association demonstrates that the emissions profile from TETRA devices is more stringent than the emission mask requirements of Section 90.210 for emissions in the adjacent bands.²⁸ Finally, the Association notes that TETRA coexists with other technologies in several other countries.²⁹ Based on this record, it appears that TETRA technology provides sufficient interference protection to other technologies. We seek comment on this issue.

10. *Authorized bandwidth.* As noted above, Section 90.209(b)(5) limits the authorized bandwidth for land mobile radio devices operating with twenty-five kilohertz channel spacing to twenty kilohertz;³⁰ however, TETRA equipment operates with a bandwidth of up to twenty-two kilohertz.³¹ With respect to the concern expressed by some commenters that this may result in adjacent channel interference from TETRA devices, we make two observations. First, we note that a device with a bandwidth of twenty-two kilohertz is still within the twenty-five kilohertz channel spacing, and the increase from twenty to twenty-

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to interact with one another and to exchange information according to a prescribed method in order to achieve predictable results.” See 47 C.F.R. § 90.7.

²² See, e.g., Harris comments at 2.

²³ See Request at 9; see also Bay Electronics comments at 2; WEST comments at 2.

²⁴ See Telecommunications Industry Association/Electronics Industry Association Telecommunications Systems Bulletin 88 (TSB-88), *Wireline Communications System -- Performance in Noise and Interference-Limited Situations -- Recommended Methods for Technology-Independent Modeling, Simulation, and Verification* (January 1998). TSB-88 is a technical bulletin describing a methodology for predicting coverage and interference for private land mobile radio stations operating below 512 MHz. In general, the TSB-88 methodology is used by frequency coordinators and others to determine channel availability based on predicted contours, i.e., TSB-88 is used to ensure that the predicted interference contour of a proposed station does not impinge on the service contours of other stations. National Science and Technology Network, Inc., *Memorandum Opinion and Order*, 25 FCC Rcd 549, 549 n.4 (2010).

²⁵ See Request, Attachment A. ACPR is the ratio of the average power in the adjacent frequency channel to the average power in the transmitted frequency channel.

²⁶ We disagree with Motorola’s suggestion that ACPR is not an effective method of evaluating potential interference. See Motorola comments at 4-5; see also APCO comments at 2. ACPR is a widely accepted test parameter for characterizing the interference potential of a device. An identical methodology (adjacent channel power or ACP) is currently utilized in the Commission’s Rules in lieu of emission masks to determine interference potential in certain public safety bands. See 47 C.F.R §§ 27.53(e), 90.543(a).

²⁷ See Request, Attachment A at 7.

²⁸ *Id.* at 2.

²⁹ See Request at 8.

³⁰ See 47 C.F.R. § 90.209(b)(5).

³¹ See Request at 1.

two kilohertz does not appear likely to have a significant impact on adjacent channel interference. Second, we believe that the more stringent TETRA limits on adjacent channel power (ACP) and out-of-band emissions would serve to prevent any potential increase in adjacent channel interference from the wider authorized bandwidth of TETRA devices. Therefore, we propose to amend Section 90.209(b)(5) to provide that devices which comply with the more stringent TETRA ACP limits may have an authorized bandwidth of twenty-two kilohertz bandwidth on a twenty-five kilohertz channel.³² We seek comment on this proposal. In addition, we ask whether we should provide additional flexibility to accommodate other technologies that might be developed. For example, should we allow a device to have an authorized bandwidth of up to twenty-five kilohertz so long as it meets the proposed ACP limits? If so, would the approval of such devices affect public safety interoperability?

11. *Emission mask.* As noted above, TETRA emissions slightly exceed Emission Masks B, C, and G in Section 90.210. Specifically, the information submitted by the Association indicates that TETRA emissions exceed the Part 90 emission masks by up to five decibels in the “shoulder” of the masks, around ten kilohertz offset from the center frequency.³³ With the exception of this slight deviation, the TETRA emissions are at or below (and in some instances, well below) the Part 90 emission masks. Overall, the emission profile for TETRA equipment is more stringent than the Part 90 limits for emissions in the adjacent channel.³⁴ We believe (and the TSB-88 analysis discussed above appears to indicate) that this results in an emission with a decreased adjacent-channel interference potential compared to an emission that complies with the Part 90 emission masks. Therefore, as an alternative to the emission limits of 90.210, we propose to permit equipment (including TETRA devices) to comply with the ACP limits in the TETRA standard for emissions close to the carrier, or up to seventy-five kilohertz offset from the carrier.³⁵ At offset frequencies greater than seventy-five kilohertz, we propose that the emission limits default to the standard limit for Part 90 devices, $43 + 10\log(P)$.³⁶ We request comment on this proposal.

12. *Other issues.* Some commenters express concern that TETRA technology typically uses a low elevation, cellular-type architecture that could cause near-far interference to incumbent high-site systems.³⁷ The Association replies that the cell sizes used with TETRA technology are large enough that

³² See proposed Section 90.221 in Appendix A for the specific ACP requirements.

³³ See Request at 5-7.

³⁴ We also note that the ACP limits in the TETRA standard are at least as stringent as the ACP limits in our rules governing the 700 MHz band. For example, the ACP limits in the adjacent channel for devices operating with a 25 kHz bandwidth in the 700 MHz band is -40 dBc for 6.25 kHz of the 25 kHz adjacent channel and -60 dBc for the remainder of the adjacent channel. See 47 C.F.R. § 90.543(a). The corresponding limit for TETRA equipment in the adjacent 25 kHz band is -55 dBc for low power equipment (up to 1 watt) and -60 dBc for higher power devices. See TETRA Association reply comments, Attachment B at 6.

³⁵ See Request at 4-5. The TETRA standard contains ACP adjacent channel limits for emissions up to seventy-five kilohertz offset from the carrier and wideband noise limits for frequencies offset one hundred kilohertz and greater.

³⁶ See 47 C.F.R. §§ 90.210(b)(3), (c)(3), (g)(2). While the Association specified the limits in the ETSI TETRA standard for these emissions, we believe that TETRA devices will meet these and many other technical requirements in the TETRA standard, and we see no need to deviate from the limits already established in Part 90. Further, we note that the less stringent limit of $43 + 10\log(p)$ is applied at a point that is more than 250 % of the authorized bandwidth removed from the assigned frequency as currently required in Section 90.210. Therefore, the application of ACP limits closer to the carrier is more stringent than what is currently required in Sections 90.210(b)(3), (c)(3), and (g)(2).

³⁷ See Motorola comments at 2; NPSTC comments at 4; APCO comments at 2. Near-far interference has been explained as follows:

(continued....)

the potential for near-far interference is reduced.³⁸ We are sensitive to the complex issues that may result when different system architectures operate in the same wireless environment.³⁹ Therefore, we request comment on whether any restriction should be placed on the use of TETRA technology with low elevation, cellular-type architecture. In particular, we request comment on whether we should adopt, for TETRA, the same definition of “high density cellular system” applicable to Enhanced Specialized Mobile Radio (ESMR) in Section 90.7 of the Commission’s Rules.⁴⁰

13. We seek comment on whether any rule changes other than those set forth in Appendix A are necessary to permit the certification and use of TETRA equipment. We also invite commenters to address any other related issues, such as whether the use of TETRA technology should be limited to or excluded from particular bands or particular services.

14. In particular, we seek comment on whether use of TETRA technology should be permitted on Public Safety Pool frequencies. We note that many 800 MHz Public Safety Pool licensees are adopting Phase I Project 25 technology, which operates with Frequency Division Multiple Access, and therefore is incompatible with TETRA, which uses TDMA. Commenters therefore should address how the deployment of TETRA technology in the Public Safety Pool would generally affect interoperability, and whether, if public safety use is authorized, TETRA radios should be required to operate with conventional FM on the NPSPEC mutual aid channels.

15. We also seek comment regarding interoperability between different system architectures. For example, many U.S. narrowband systems are based on Project 25 systems that utilize different interfaces and, in some cases, channel size. Can we ensure that interoperability exists between TETRA systems and Project 25 systems and other narrowband systems that are currently deployed or being deployed? Also, can interoperability be achieved with the 700 MHz narrowband and broadband systems that public safety is currently deploying? Are there new specifications that have to be developed for these systems to support interoperability? Is one solution the use of gateways,⁴¹ and are these currently available? What are the costs and technical availability of possible solutions? Additionally, is it possible to make roaming feasible for the user of a system to roam to another system? Would that require multimode devices with additional interoperability infrastructure? If so, what is that infrastructure? Finally, if interoperability between TETRA technology and other system architectures cannot be achieved, we seek comment on what eligibility or technical limitations should be imposed on the deployment of TETRA technology in

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Cellular systems, by design, are composed of large numbers of base stations within a relatively small geographic area. Public safety systems, on the other hand, are typically composed of high-powered base stations operating at a few sites that provide coverage to a large geographic area. This mix of network architectures often result in an interference scenario--sometimes referred to as “near-far”--that arises when a cellular system operates in close proximity to a public safety system. In the near-far scenario, interference occurs where a public safety mobile/portable unit receives a stronger signal from a nearby, adjacent channel commercial base station rather than from the desired, distant public safety transmitter.

See Service Rules for the 698-746, 747-762 and 777-792 MHz Bands, *Second Report and Order*, WT Docket No. 06-150, 22 FCC Rcd 15289, 15386 n.606 (2007).

³⁸ *See* TETRA Association reply comments at 6 n.17.

³⁹ In the 800 MHz rebanding proceeding, the Commission restricted high density cellular systems to the ESMR portion of the band (817-824/862-869 MHz in most areas of the United States) to prevent near-far interference. *See* 47 C.F.R. § 90.614(a).

⁴⁰ 47 C.F.R. § 90.7.

⁴¹ A gateway for these purposes could be a bridge or interconnection between systems.

order to prevent any impairment of public safety interoperability.

IV. ORDER

16. Section 1.925 of the Commission's Rules provides that we may grant a waiver if it is shown that: (a) 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 (b) 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.⁴² We conclude that the Association's waiver request should be granted in part, to permit the certification, manufacture, and use of TETRA equipment under certain conditions pending resolution of the *Notice of Proposed Rule Making* in this proceeding. We find granting this waiver to be in the public interest, for the reasons set forth below.

17. *Procedural issues.* Some commenters question whether the Association has standing to request a waiver on behalf of TETRA equipment manufacturers.⁴³ There is ample precedent for granting a waiver to an association on behalf of its members.⁴⁴ Moreover, we see no difference between granting a waiver to the Association and granting a waiver to a particular manufacturer (*e.g.*, Sepura, which filed comments supporting the waiver request) "and any other responsible party" that meets the conditions specified herein.⁴⁵

18. In addition, one commenter suggests that the waiver request is unripe, because the entity that controls the intellectual property rights to TETRA technology in the United States will not permit it to be used.⁴⁶ We agree with the Association that this issue is not relevant to whether the Commission should now grant the waiver.⁴⁷ We address only whether a waiver of the Part 90 technical rules is appropriate; we are not adjudicating the intellectual property rights to TETRA technology.

19. Finally, as noted above, some commenters argue that the question of whether to permit the use of TETRA technology should be addressed in a rulemaking proceeding rather than in the context of a waiver request.⁴⁸ We note, however, that it can be appropriate to grant a waiver pending the outcome of a

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

⁴³ *See, e.g.*, Harris comments at 6.

⁴⁴ *See* Motion Picture Association of America, *Memorandum Opinion and Order*, 25 FCC Rcd 4799 (MB 2010); National Association of Broadcasters, *Memorandum Opinion and Order*, 16 FCC Rcd 18939 (MMB 2001); National Exchange Carrier Association, Inc., *Order*, 15 FCC Rcd 19716 (CCB 2000).

⁴⁵ *See* Amendment of Part 15 of the Commission's Rules to Establish Regulations for Tank Level Probing Radars in the Frequency Band 77-81 GHz, *Notice of Proposed Rule Making and Order*, ET Docket No. 10-23, 25 FCC Rcd 601, 610 ¶ 25 (2010) (*Tank Level Waiver Order*).

⁴⁶ *See* Skybridge Parties comments at 9-10. The Skybridge Parties also assert that the waiver request is actually part of a conspiracy to delay the implementation of TETRA technology in the United States. *See* Skybridge Parties reply comments at 1-2. This unsupported allegation does not merit discussion.

⁴⁷ *See* TETRA Association reply comments at 8.

⁴⁸ *See, e.g.*, TIA comments at 3-4 (citing, *e.g.*, Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range, *Memorandum Opinion and Order and Second Report and Order*, ET Docket No. 98-206, 17 FCC Rcd 9614, 9699 ¶ 218 (2002), *aff'd sub nom.* Northpoint, Ltd. v. FCC, 414 F.3d 61 (D.C. Cir. 2005); Nextel Communications, Inc., *Order*, 14 FCC Rcd 11678, 11691-92 ¶ 31 (WTB 1999)).

related rulemaking proceeding.⁴⁹ Such action is warranted where the public interest would be served by permitting a new generation of devices with improved performance, where there is no significant risk of harmful interference to other users.⁵⁰ We therefore will proceed to consider the merits of the waiver request.

20. *Waiver of Sections 90.209 and 90.210.* We conclude that the underlying purpose of the Part 90 authorized bandwidth and emission limits – to limit interference to other users – would generally not be served by rigid application to TETRA technology in many instances. The TETRA standard meets all Part 90 requirements except for those pertaining to occupied bandwidth and emission masks. Based on the record before us, it appears that the slight increase in authorized bandwidth and the *de minimis* area of non-compliance with the emission masks would not likely cause increased interference to adjacent channel users. In fact, the analysis submitted by the Association⁵¹ suggests that TETRA has a lower adjacent channel interference potential than other land mobile technologies currently in use.

21. With respect to whether grant of the requested waiver would be in the public interest, a number of commenters state that grant of the waiver request would provide users with an affordable, technologically advanced alternative to currently available equipment.⁵² We also note that, as of January 1, 2011, most new and expanded private land mobile radio systems in the 150–174 MHz and 421–512 MHz bands must operate with an authorized bandwidth not exceeding 11.25 kHz, or with equivalent efficiency, and that existing systems will be required to meet this efficiency standard by January 1, 2013.⁵³ Because TETRA equipment operates with the required efficiency, we believe it is in the public interest to authorize this option for licensees that are subject to these narrowbanding deadlines. We therefore grant the Association’s request for waiver of Sections 90.209 and 90.210, subject to the limitations and conditions set forth in the following paragraphs.

22. In response to commenters’ concern about potential interference to public safety communications,⁵⁴ the Association states that it does not intend to market TETRA equipment to public safety licensees.⁵⁵ We therefore limit operation of TETRA equipment pursuant to this waiver to Industrial/Business Pool frequencies in the 450-470 MHz band, and ESMR frequencies in the 800 MHz band.⁵⁶ In addition, to address concerns about near-far interference,⁵⁷ this waiver does not authorize use

⁴⁹ See, e.g., *Tank Level Waiver Order*, 25 FCC Rcd at 610 ¶ 25; Request for Waiver to Allow Aeronautical Utility Mobile Stations to Use 1090 MHz for Runway Vehicle Identification and Collision Avoidance, *Order*, 25 FCC Rcd 1407 (WTB MD 2010).

⁵⁰ See *Tank Level Waiver Order*, 25 FCC Rcd at 610 ¶ 25.

⁵¹ See para. 11, *supra*.

⁵² See, e.g., Bay Electronics comments at 1-2.

⁵³ See 47 C.F.R. § 90.209(b)(5)-(6).

⁵⁴ See, e.g., NPSTC comments at 2-3; APCO comments at 1-2.

⁵⁵ See TETRA Association reply comments at 5 n.13.

⁵⁶ One commenter argues that TETRA technology should not be permitted on standard 25 kHz channel centers in the 450-470 MHz band, because doing so would encumber three 12.5 kHz channels, while only two 12.5 kHz channels would be encumbered if the 25 kHz channel assigned to the TETRA system consisted of two adjacent 12.5 kHz channels. See Aclara comments at 2. We disagree with the suggestion that TETRA equipment be required or permitted to utilize two adjacent 12.5 kHz channels instead of one 25 kHz channel. This would not be compatible with the frequency tables in Part 90 of the rules, which only permit frequency assignments for authorized bandwidths exceeding 11.25 kHz on 25 kHz channel centers. See 47 C.F.R. §§ 90.20(d)(27), 90.35(c)(30).

⁵⁷ See Motorola comments at 2; NPSTC comments at 4; APCO comments at 2.

of TETRA equipment on the 800 MHz band channels on which our rules prohibit operation of high density cellular systems.⁵⁸ The issues of TETRA use in the public safety bands and with cellular-like architecture will be addressed in the rulemaking proceeding. Applications for Industrial/Business and Business/Industrial Land Transportation Pool systems that will use TETRA equipment must reference this *Notice of Proposed Rule Making and Order* (by the FCC number appearing in the header).⁵⁹

23. *Equipment authorization.* The Association also requests that Section 2.1043 of the rules be waived for those manufacturers that have already received equipment approval using reduced power.⁶⁰ It proposes that these manufacturers be permitted to market these devices with full power, without obtaining a new equipment authorization. Ordinarily, manufacturers would be required to obtain new equipment authorizations consistent with the parameters of the waiver granted herein before any TETRA device could be operated with changes to its maximum power.⁶¹ We conclude, however, that this is not necessary for TETRA devices that have already received equipment approval using reduced power, for, as noted above, we believe that the TETRA emission poses no increased adjacent-channel interference potential compared to an emission that complies with the Part 90 emission masks. Therefore, for currently certificated TETRA devices that can be modified to operate with a higher transmitter output power by software upgrade without any hardware change, we waive our equipment authorization rules to permit the modification to be treated as a Class II permissive change.⁶²

24. The Association appears to request a waiver to permit certification and use of TETRA equipment in the 450-470 MHz, 806-849 MHz, and 851-894 MHz bands.⁶³ We note, however, that only the 806-824/851-869 MHz portion of the 806-849/851-894 MHz bands is designated for Part 90 use,⁶⁴ and only the 817-824/862-869 MHz segment is designated for high density cellular systems.⁶⁵ Consequently, equipment will be authorized pursuant to this waiver only for the 450-470 MHz and 817-824/862-869 MHz bands. In lieu of meeting the authorized bandwidth and emission limits in Sections 90.209 and 90.210, TETRA devices submitted for approval pursuant to this waiver shall meet the maximum adjacent power levels and wideband noise limits in the ETSI TETRA standard, EN 300 392-2.

⁵⁸ See 47 C.F.R. § 90.614; see also 47 C.F.R. § 90.7 (defining 800 MHz high density cellular system as a cellular that has more than five overlapping interactive sites featuring hand-off capability, and any one of such sites has an antenna height of less than 30.4 meters (100 feet) above ground level with an antenna height above average terrain of less than 152.4 meters (500 feet). See also 47 C.F.R. § 90.619 Table C10 (ESMR Category 817–824/862–869 MHz Channels Available for 800 MHz High Density Systems in the Canada border region).

⁵⁹ Licensees seeking to convert existing systems to TETRA equipment must file a modification application to reflect the different technical parameters. Applications for modified Part 90 stations generally require frequency coordination before the application is submitted to the Commission, “but certain types of applications are exempt from the frequency coordination requirement because they do not ‘have an impact on near-term frequency selections.’” See Amendment of Part 90 of the Commission’s Rules, *Second Report and Order and Second Further Notice of Proposed Rule Making*, WP Docket No. 07-100, 25 FCC Rcd 2479, 2480-81 ¶ 4 (2010) (quoting Frequency Coordination in the Private Land Mobile Radio Services, *Report and Order*, PR Docket No. 83-737, 103 F.C.C. 2d 1093, 1150 ¶ 116 (1986)). We conclude that frequency coordination should not be required for modification applications filed pursuant to this waiver where the only change is to reflect the TETRA emission.

⁶⁰ Request at 7-8; see para. 5, *supra*.

⁶¹ See 47 C.F.R. §§ 2.932(a), 2.1043(a).

⁶² See 47 C.F.R. § 2.1043(b)(2).

⁶³ See Request at 3.

⁶⁴ See 47 C.F.R. § 90.601.

⁶⁵ See 47 C.F.R. § 90.614.

All applications for equipment authorization or permissive change filings pursuant to this waiver must be submitted with a copy of this *Notice of Proposed Rule Making and Order*.

V. PROCEDURAL MATTERS

25. *Initial Regulatory Flexibility Analysis*. As required by Section 603 of the Regulatory Flexibility Act, 5 U.S.C. § 603, the Commission has prepared an Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on small entities of the proposals suggested in the *Notice of Proposed Rule Making*. The IRFA is set forth in Appendix B.

26. *Initial Paperwork Reduction Analysis*. The *Notice of Proposed Rule Making* does not contain proposed new or modified information collection requirements.

27. *Comments*. Pursuant to Sections 1.415 and 1.419 of the Commission's rules, 47 C.F.R. §§ 1.415, 1.419, interested parties may file comments to the *Notice of Proposed Rule Making* on or before the dates indicated on the first page of this document. Comments may be filed using: (1) the Commission's Electronic Comment Filing System (ECFS), (2) the Federal Government's eRulemaking Portal, or (3) by filing paper copies. See *Electronic Filing of Documents in Rulemaking Proceedings*, 63 Fed. Reg. 24121 (1998).

- Electronic Filers: Comments may be filed electronically using the Internet by accessing the ECFS: <http://fjallfoss.fcc.gov/ecfs2/> or the Federal eRulemaking Portal: <http://www.regulations.gov>.
- Paper Filers: Parties who choose to file by paper must file an original and four copies of each filing. If more than one docket or rulemaking number appears in the caption of this proceeding, filers must submit two additional copies for each additional docket or rulemaking number.

Filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.

- Effective December 28, 2009, all hand-delivered or messenger-delivered paper filings for the Commission's Secretary must be delivered to FCC Headquarters at 445 12th St., SW, Room TW-A325, Washington, DC 20554. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes must be disposed of before entering the building.
- Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9300 East Hampton Drive, Capitol Heights, MD 20743. U.S. Postal Service first-class, Express, and Priority mail must be addressed to 445 12th Street, SW, Washington DC 20554.

People with Disabilities: To request materials in accessible formats for people with disabilities (braille, large print, electronic files, audio format), send an e-mail to fcc504@fcc.gov or call the Consumer & Governmental Affairs Bureau at 202-418-0530 (voice), 202-418-0432 (tty).

28. *Further Information*. For further information, contact Tim Maguire, Mobility Division, Wireless Telecommunications Bureau, at (202) 418-2155, or via the Internet at tim.maguire@fcc.gov.

VI. ORDERING CLAUSES

29. IT IS ORDERED that pursuant to Sections 1, 4(i), 303(f), 303(g), and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. §§ 151, 154(i), 303(f), 303(g), and 303(r), this *Notice of Proposed Rule Making* IS ADOPTED.

30. IT IS FURTHER ORDERED that the Commission's Consumer and Governmental Affairs

Bureau, Reference Information Center, SHALL SEND a copy of this *Notice of Proposed Rule Making*, including the Initial Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

31. IT IS FURTHER ORDERED that pursuant to Sections 4(i), 302, and 303(e), of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 302, and 303(e), and Section 1.925 of the Commission's Rules, 47 C.F.R. § 1.925, the Request for Waiver filed by the TETRA Association on November 20, 2009, IS GRANTED IN PART and DENIED IN PART to the extent set forth above. This action is effective upon release of this *Order*.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

APPENDIX A
Proposed Rules

Chapter 1 of Title 47 of the Code of Federal Regulations is proposed to be amended as follows:

Part 90 – Private Land Mobile Radio Services

1. The authority citation for Part 90 continues to read as follows:

AUTHORITY: Sections 4(i), 11, 303(g), 303(r), and 332(c)(7) of the Communications Act of 1934, as amended, 47 U.S.C. 154(i), 161, 303(g), 303(r), 332(c)(7).

2. Section 90.209 is revised by amending paragraph (b)(5) to add footnote 6 to the table to read as follows:

§ 90.209 Bandwidth limitations.

* * * * *

(b) * * *

(5) * * *

STANDARD CHANNEL SPACING/BANDWIDTH

Frequency band (MHz)	Channel spacing (kHz)	Authorized bandwidth (kHz)
* * *		
406–512 ²	¹ 6.25	^{1,3,6} 20/11.25/6
806–809/851–854	12.5	⁶ 20
809–824/854–869	25	⁶ 20
* * *		
929–930	25	⁶ 20
* * *		

¹ For stations authorized on or after August 18, 1995.

² Bandwidths for radiolocation stations in the 420–450 MHz band and for stations operating in bands subject to this footnote will be reviewed and authorized on a case-by-case basis.

³ Operations using equipment designed to operate with a 25 kHz channel bandwidth will be authorized a 20 kHz bandwidth. Operations using equipment designed to operate with a 12.5 kHz channel bandwidth will be authorized a 11.25 kHz bandwidth. Operations using equipment designed to operate with a 6.25 kHz channel bandwidth will be authorized a 6 kHz bandwidth. All stations must operate on channels with a bandwidth of 12.5 kHz or less beginning January 1, 2013, unless the operations meet the efficiency standard of §90.203(j)(3).

* * *

⁶ Operations using equipment designed to operate with a 25 kHz channel bandwidth may be authorized up to a 22 kHz bandwidth if the equipment meets the Adjacent Channel Power limits of § 90.221.

* * * * *

3. Section 90.210 is revised by amending the introductory paragraph to add footnote 5 to the table to read as follows:

§ 90.210 Emission masks.

* * *

APPLICABLE EMISSION MASKS

Frequency band (MHz)	Mask for equipment with Audio low pass filter	Mask for equipment without audio low pass filter
* * *		
421–512 ^{2, 5}	B, D, or E	C, D, or E
* * *		
809–824/854–869 ^{3, 5}	B	G
* * *		

* * *

² Equipment designed to operate with a 25 kHz channel bandwidth must meet the requirements of Emission Mask B or C, as applicable. Equipment designed to operate with a 12.5 kHz channel bandwidth must meet the requirements of Emission Mask D, and equipment designed to operate with a 6.25 kHz channel bandwidth must meet the requirements of Emission Mask E.

³ Equipment used in this licensed to EA or non-EA systems shall comply with the emission mask provisions of § 90.691.

* * *

⁵ Equipment in the 450-470 MHz and 817-824/862-869 MHz bands may alternatively meet the Adjacent Channel Power Limits of § 90.221.

* * * * *

4. New Section 90.221 is added to read as follows:

§ 90.221 Adjacent Channel Power Limits

(a) For the frequency bands indicated in 90.209, operations using equipment designed to operate with a 25 kHz channel bandwidth may be authorized up to a 22 kHz bandwidth if the equipment meets the adjacent channel power (ACP) limits below. The table specifies a value for the ACP as a function of the displacement from the channel center frequency and a measurement bandwidth of 25 kHz.

(b) Maximum adjacent power levels for frequencies below 700MHz:

Frequency Offset	Maximum ACP (dBc) for devices 1 watt and less	Maximum ACP (dBc) for devices above 1 watt
25 kHz	-55 dBc	-60 dBc
50 kHz	-70 dBc	-70 dBc
75 kHz	-70 dBc	-70 dBc

In any case, no requirement in excess of -36 dBm shall apply.

(c) Maximum adjacent power levels for frequencies above 700MHz:

Frequency Offset	Maximum ACP (dBc) for devices less than 15 watts	Maximum ACP (dBc) for devices 15 watts and above
25 kHz	-55 dBc	-55 dBc
50 kHz	-65 dBc	-65 dBc
75 kHz	-65 dBc	-70 dBc

In any case, no requirement in excess of -36 dBm shall apply.

(d) On any frequency removed from the assigned frequency by more than 75 kHz, the attenuation of any emission must be at least $43 + 10 \log (P)$ dB.

APPENDIX B**Initial Regulatory Flexibility Analysis**

As required by the Regulatory Flexibility Act (RFA),¹ the Commission has prepared this Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on small entities of the policies and rules proposed in the *Notice of Proposed Rule Making* in WP Docket No. 1x-xxx (*NPRM*). Written public comments are requested on this IRFA. Comments must be identified as responses to the IRFA and must be filed by the deadlines for comments on the *NPRM* as provided in paragraph 25 of the item, *supra*. The Commission will send a copy of the *NPRM*, including this IRFA, to the Chief Counsel for Advocacy of the Small Business Administration.² In addition, the *NPRM* and IRFA (or summaries thereof) will be published in the Federal Register.³

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

The proposed rules in the *NPRM* are intended to permit the implementation in the United States of land mobile radio equipment utilizing Terrestrial Trunked Radio (TETRA) technology. TETRA is a spectrally efficient digital technology that we believe can provide valuable benefits to land mobile radio users.

B. Legal Basis

Authority for issuance of this item is contained in Sections 4(i), 303(r), and 403 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 303(r), and 403.

C. Description and Estimate of the Number of Small Entities to Which the Proposed Rules Will Apply

The RFA directs agencies to provide a description of and, where feasible, an estimate of the number of small entities that may be affected by the proposed rules, if adopted.⁴ The RFA generally defines the term “small entity” as having the same meaning as the terms “small business,” “small organization,” and “small governmental jurisdiction.”⁵ In addition, the term “small business” has the same meaning as the term “small business concern” under the Small Business Act.⁶ A small business concern is one that: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the SBA.⁷ Pursuant to 5 U.S.C. § 601(3), the statutory definition of a small business applies “unless an agency after consultation with the Office of Advocacy of the SBA, and after opportunity for public comment, establishes one or more definitions of

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

² See 5 U.S.C. § 603(a).

³ *Id.*

⁴ 5 U.S.C. § 603(b)(3).

⁵ *Id.*

⁶ 5 U.S.C. § 601(3).

⁷ 5 U.S.C. § 632.

such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register.” Below, we further describe and estimate the number of small entity licensees and regulatees that may be affected by the rules changes proposed in this *NPRM*.

Private Land Mobile Radio Licensees. PLMR systems serve an essential role in a range of industrial, business, land transportation, and public safety activities. These radios are used by companies of all sizes operating in all U.S. business categories, and are often used in support of the licensee’s primary (non-telecommunications) business operations. For the purpose of determining whether a licensee of a PLMR system is a small business as defined by the SBA, we use the broad census category, Wireless Telecommunications Carriers (except Satellite). This definition provides that a small entity is any such entity employing no more than 1,500 persons.⁸ The Commission does not require PLMR licensees to disclose information about number of employees, so the Commission does not have information that could be used to determine how many PLMR licensees constitute small entities under this definition. We note that PLMR licensees generally use the licensed facilities in support of other business activities, and therefore, it would also be helpful to assess PLMR licensees under the standards applied to the particular industry subsector to which the licensee belongs.⁹

As of March 2010, there were 424,162 PLMR licensees operating 921,909 transmitters in the PLMR bands below 512 MHz. We note that any entity engaged in a commercial activity is eligible to hold a PLMR license, and that any revised rules in this context could therefore potentially impact small entities covering a great variety of industries.

RF Equipment Manufacturers. The Census Bureau defines this category as follows: “This industry comprises establishments primarily engaged in manufacturing radio and television broadcast and wireless communications equipment. Examples of products made by these establishments are: transmitting and receiving antennas, cable television equipment, GPS equipment, pagers, cellular phones, mobile communications equipment, and radio and television studio and broadcasting equipment.”¹⁰ The SBA small business size standard for Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing is all such firms having 750 or fewer employees.¹¹ According to Census Bureau data for 2002, there were a total of 1,041 establishments in this category that operated for the entire year.¹² Of this total, 1,010 had employment of under 500, and an additional 13 had employment of 500 to 999.¹³ Thus, under this size standard, the majority of firms can be considered small.

⁸ See 13 C.F.R. § 121.201, NAICS code 517210.

⁹ See generally 13 C.F.R. § 121.201.

¹⁰ U.S. Census Bureau, 2002 NAICS Definitions, “334220 Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing”; <http://www.census.gov/epcd/naics02/def/NDEF334.HTM#N3342>.

¹¹ See 13 C.F.R. § 121.201, NAICS code 334220.

¹² U.S. Census Bureau, American FactFinder, 2002 Economic Census, Industry Series, Industry Statistics by Employment Size, NAICS code 334220 (released May 26, 2005); <http://factfinder.census.gov>. The number of “establishments” is a less helpful indicator of small business prevalence in this context than would be the number of “firms” or “companies,” because the latter take into account the concept of common ownership or control. Any single physical location for an entity is an establishment, even though that location may be owned by a different establishment. Thus, the numbers given may reflect inflated numbers of businesses in this category, including the numbers of small businesses. In this category, the Census breaks-out data for firms or companies only to give the total number of such entities for 2002, which was 929.

¹³ *Id.* An additional 18 establishments had employment of 1,000 or more.

D. Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements for Small Entities

There are no projected reporting, recordkeeping or other compliance requirements.

E. Steps Taken to Minimize Significant Economic Impact on Small Entities and Significant Alternatives Considered

The RFA requires an agency to describe any significant alternatives that it has considered in reaching its proposed approach, which may include the following four alternatives: (1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance or reporting requirements under the rule for small entities; (3) the use of performance, rather than design, standards; and (4) an exemption from coverage of the rule, or any part thereof, for small entities.¹⁴

We hereby invite interested parties to address any or all of these regulatory alternatives and to suggest additional alternatives to minimize any significant economic impact on small entities. Any significant alternative presented in the comments will be considered.

F. Federal Rules that May Duplicate, Overlap, or Conflict with the Proposed Rules

None.

¹⁴ 5 U.S.C. § 603(c)(1)-(4).