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

ET Docket No. 96-2

In the Matter of

Amendment of the Commission's Rules to Establish a Radio Astronomy Coordination Zone in Puerto Rico — RM-8165

NOTICE OF PROPOSED RULE MAKING

Adopted: January 18, 1996; Released: February 8, 1996

By the Commission:

I. INTRODUCTION

1. By this action, the Commission proposes to establish a Coordination Zone covering the islands of Puerto Rico, Desecheo, Mona, Vieques, and Culebra within the Commonwealth of Puerto Rico (the Puerto Rican Islands). This proposal would require applicants for new and modified radio facilities in various communications services within the Coordination Zone to provide written notification of their proposed operations to the Arecibo Radio Astronomy Observatory (Observatory) near Arecibo, Puerto Rico, at the time their application is submitted to the Commission. Such notification would enable the Observatory to receive information needed to assess whether applicants' proposals would cause harmful interference to the Observatory's radio astronomy operations and would promote efficient resolution of problems through informal coordination between applicants and the Observatory. Applicants would be responsible for making reasonable efforts to accommodate the interference concerns of the Observatory.

II. BACKGROUND

2. On November 30, 1992, Cornell University (Cornell), operator of the Arecibo Observatory, filed a Petition for Rulemaking (RM-8165), requesting that the Puerto Rican Islands be designated as a Coordination Zone.[1] Cornell submits that this action is necessary to assure that the Observatory is notified of proposed additions or changes in spectrum utilization that could affect radio astronomy operations and to facilitate coordination and interference avoidance among spectrum users.

3. In making this request, Cornell indicates that Arecibo Observatory is an important facility which provides radio astronomy capabilities that are unique worldwide. It states that the Observatory is the site of the world's largest radio/radar telescope. This telescope has a reflector that is 1000 feet in diameter and 167 feet deep, with a primary surface collection area covering 20 acres. Cornell states that the Observatory employs sensitive receivers, powerful interplanetary and ionospheric transmitters, and sophisticated data acquisition and analysis equipment in conjunction with this reflector to provide highly versatile and powerful radio astronomy research capabilities.

4. Cornell also submits that the Observatory is located on a plateau that has nearly direct line-of-sight to 70 percent of the island territory of Puerto Rico and the neighboring island areas and to the communications transmission facilities located there. It states that as a result, operations of the Observatory can be significantly affected by communications operations in Puerto Rico and the surrounding island areas. Cornell further indicates that the Observatory, constructed originally in 1960-63 to operate on frequencies up to 500 MHz, was extensively upgraded in 1972-74 to operate on frequencies up to 3 GHz. It also states that a $22.8 million upgrade of the Observatory funded by the National Science Foundation and the National Aeronautics and Space Administration is now underway and is expected to be completed by mid-1996. This upgrade will enable the Observatory to make routine observations at frequencies up to 15 GHz and will increase the sensitivity of the Observatory's telescope by 50 percent. Cornell adds that the Observatory's telescope operates continuously, each day of the year. Twenty-three parties filed comments, and two filed reply comments in response to Cornell's petition.[2]

III. DISCUSSION

A. *Need for a Coordination Zone*

5. *Petitioner's Request.* Cornell requests that we designate the Puerto Rican Islands of Puerto Rico, Desecheo, Mona, Vieques, and Culebra as a Coordination Zone, within which applicants proposing to operate therein pursuant to Parts 5, 21, 22, 23, 25, 73, 74, 78, 80, 87, 90, 94, 95, or 97 of the Commission's rules would be required to provide the Observatory with sufficient technical information for the Observatory to ascertain whether they would cause it harmful interference.[3] Cornell states that the Observatory could then explore with these applicants alternatives such as power reduction, site relocation, directionalization and other methods to eliminate or sufficiently reduce harmful interference.[4] It submits that the relevant technical information necessary for interference analysis should be required to be provided to the Observatory no later than the date the application is filed with the Commission. Cornell also requests that the Observatory be permitted 20 days to analyze the information and file comments on the applica-

[1] Cornell indicates that it operates the Observatory under a cooperative agreement with the National Science Foundation and that the Observatory is part of the National Astronomy and Ionosphere Center. Cornell originally requested that the islands be designated as a "Communications Zone," but later amended its request to specify that the islands be designated as a "Coordination Zone." *See* Cornell Reply at 3, Supplement to Reply at note 1. The former designation, synonymous with the term "Quiet Zone," signifies greater regulatory protection than mere notification. *See infra*, paras. 20-21.

[2] *See* Appendix for a list of commenting parties.

[3] Cornell's proposal would generally exclude mobile stations, temporary base stations, temporary fixed stations, the Civil Air Patrol, and new amateur stations (other than amateur beacon and repeater stations) from the requirement to notify and coordinate with the Observatory.

[4] Petition at 7.

tion.[5] In making this request, Cornell disclaims any intent "to obtain veto power over, or to bind the hands of, other [radio] services operating" in Puerto Rico or to create a Quiet Zone in Puerto Rico, explaining that it "is merely attempting to deal with future changes to the [radiofrequency interference] environment in an efficient manner."[6]

6. In requesting that the Puerto Rican Islands be designated a Coordination Zone, Cornell states that when the Observatory was constructed in 1960-63, Puerto Rico had a quiet radio environment, but since then has become one of the most heavily used radio environments in the United States. Cornell argues that because cosmic signals are very weak and the Observatory's radio astronomy equipment is extremely sensitive, the equipment must be protected from man-made interference. Cornell contends that interference problems already make it necessary for astronomers to perform multiple observations in order to be assured of accurate results.[7] Cornell submits that interference problems at Arecibo Observatory have also worsened dramatically during the last decade, as the result of a number of factors: 1) a steady reduction of internal equipment noise[8] at the Observatory due to the application of state-of-the-art technology in the various stages of the observing systems; 2) searches for increasingly weaker signals in the cosmos in order to test theories and to more finely tune astrophysical models of the universe; 3) a steady increase in the number of radio services in Puerto Rico; 4) the Observatory's vulnerability to permissible harmonic emissions, such as the 13th- to 16th-order harmonics of FM broadcast stations encountered by astronomers making 1400 MHz neutral hydrogen observations; and 5) the observing platform is elevated above the surrounding terrain, which makes the Observatory particularly vulnerable to radio frequency interference.[9] As a result of this situation, Cornell states that its planned experiments are subject to a backlog of one year.

7. Cornell also states that while the Observatory is actively taking steps to suppress or eradicate radiofrequency (RF) interference to its receiving system, technology does not yet exist to permit adequate protection by such measures alone. For example, Cornell points out that the advantageous design of the telescope, with an extremely high forward gain of the main beam directed upwards, prevents radiation from entering all but the far sidelobes, which are typically one million to one hundred million times less sensitive to interference than the main beam.[10] Cornell argues that such technical steps are only part of the solution and are at best complementary to regulatory efforts.[11] It notes that to partially offset the effects of growing radio congestion around the Observatory, the Commonwealth of Puerto Rico has established a "Protection Zone" with a radius of four miles around the Observatory. This Protection Zone is intended to minimize RF interference generated in the immediate vicinity by household appliances, electric fences, or welding equipment. Additionally, Cornell states that the Puerto Rico Planning Board has drafted new zoning regulations that would prohibit microwave links from traversing or being directed at the eight-mile diameter of the Protection Zone. It observes, however, that radio services from almost any location within the Commonwealth of Puerto Rico have the potential to interfere with the Observatory. Cornell submits that it does not desire to deny any radio service the right to broadcast or serve the public, and maintains that coordination should be highly effective in controlling interference to the Observatory.

8. Cornell submits that, at present, the Observatory staff must regularly check Commission public notices to determine which applications have been filed for new or modified station facilities in Puerto Rico. It states that this procedure has been burdensome and is not failproof, citing the example of WCCV-TV, Camuy, Puerto Rico, which received a construction permit from the Commission to modify its facilities without the Observatory's knowledge.[12]

9. *Comments.* Several parties, including representatives of the scientific community and political officials in Puerto Rico, submitted comments supporting Cornell's Petition. The National Academy of Sciences (NAS) states that though the Observatory has employed measures to limit damage from sources of interference, the Observatory will exhaust ways to protect itself as RF congestion continues to grow, resulting in the corruption of much valuable scientific data.[13] In addition, NAS argues that, without a Coordination Zone, the Observatory will be forced to expend resources to monitor Commission public notices for all application filings for Puerto Rico. In contrast, according to NAS, compliance with the requirements of the Coordination Zone proposed by Cornell would impose little or no fiscal burden on applicants, yet would conserve the financial resources of the Observatory. NAS maintains that the rules proposed by Cornell would provide timely notice to the Observatory of potential services that may cause interference, so that solutions and compromises may be investigated in advance without incurring large costs.[14] NAS adds that notification could potentially save the Observatory significant expense and time by resolving potential interference problems in advance, rather than after the fact, as was the case with WCCV-TV.

10. On behalf of the city of Hatillo, Puerto Rico, Mayor Juan Luis Cuevas Castro states that the Coordination Zone would provide an "early warning system" for the Observa-

[5] In the Petition, Cornell requested 20 days to comment on applications. However, it later amended its proposal to agree with comments that suggested that 30 days would be more appropriate. Supplementary Reply at 3.

[6] Cornell Reply at 3.

[7] Petition at 4.

[8] Reducing the internal equipment noise increases the equipment's sensitivity.

[9] *Id.* & Att. B (Technical Statement) at 3-4.

[10] *Id.* Cornell states that the ongoing upgrade to the facilities will reduce sidelobe sensitivity further and will eliminate direct line of sight access to the receiving feeds at frequencies above 300 MHz by enclosing the new feed system and its subreflectors in an 83-foot diameter shielded enclosure. Also, the Observatory uses the latest receiver technology, including cryogenic filters and new mixing schemes, to minimize the reception of interference.

[11] Petition at 4.

[12] Cornell states that the Commission staff has been apprised of the interference problem with WCCV-TV and informal coordination is taking place to resolve that interference. Petition at 5.

[13] NAS Comments at 4. As an example of special interference countermeasures, NAS states that the Observatory turns off its data collection system whenever radar beams emanating from San Juan Airport are pointed toward the Observatory. *Id.*

[14] NAS Comments at 2, 10.

tory and would not constitute a threat to present or future radio services.[15] Mayor Castro also states that the Observatory has an excellent track record of working with local services to resolve interference cases. The Naval Research Laboratory (NRL) also supports Cornell's petition, stating that the Observatory's scientific work is of outstanding quality.[16] NRL maintains that previous experience with the National Radio Astronomy Observatory Quiet Zone in Green Bank, West Virginia has demonstrated that local needs for use of the RF spectrum and the needs of radio astronomy for protection from interference can be made compatible.

11. The Society of Broadcast Engineers (SBE) states that the Observatory should be afforded some form of protection against interference and that it is not unreasonably burdensome to require broadcasters to notify the Observatory of the technical details of their applications.[17] SBE states that, assuming that a Coordination Zone procedure does not create any presumption of entitlement in interference resolution, it does not object to the proposal. SBE also states that Cornell does not discuss who should bear the financial burden of interference resolution when a radio facility complies with the Commission's operation guidelines.

12. Other parties argue that Cornell has failed to demonstrate that a Coordination Zone is necessary or that the Observatory is suffering from harmful interference. The Puerto Rico Telephone Company (PRTC) asserts that the ongoing redesign of the Observatory's operation may be adequate to reduce interference problems sufficiently, and further contends that Puerto Rican law already protects the Observatory.[18] PRTC further asserts that the Coordination Zone proposal could permit Cornell to thwart license applications and prevent PRTC from improving telephone service and providing service to rural areas. It claims that Cornell's true intent is to create an inference in the Commission's rules that the Observatory deserves special protection from radio interference. PRTC contends that creating a Coordination Zone in Puerto Rico would lead to multiple radio astronomy observatories across the country requesting similar protection, and that it may not be legally possible to grant Cornell's Petition without granting similar requests from other observatories.

13. Additionally, PRTC and Come Now Radio Aeropuerto, Inc. & South Puerto Rico Broadcasting Corp. (Stations) argue that the Commission's public notices listing pending applications are adequate to inform the Observatory of potential new radio operations.[19] Stations argue that the Petition does not demonstrate that any interference experienced by the Observatory is caused by broadcast stations, and maintain that the proposed Coordination Zone will lead to unnecessary and expensive interference analysis proceedings before the Commission.

14. The Asociacion De Radiodifusores De Puerto Rico (the Radio Broadcasters Association of Puerto Rico, or "PRBA") claims that Cornell's Petition provides little evidence of any radio communications service, other than a few broadcast stations, causing interference to the Observatory. Further, PRBA notes that Section 2.1 of the rules states that the Observatory must tolerate interference that is not harmful; and that for the purposes of radio astronomy, Section 2.1 of the Commission's rules defines harmful interference as interference that "seriously degrades, obstructs, or repeatedly interrupts a radio communication service operating in accordance with these [international] Radio Regulations."[20] PRBA also claims that adopting the Coordination Zone proposal would effectively establish a spectrum allocation in Puerto Rico at variance with the Table of Frequency Allocations and permit Cornell to object to a proposed radio operation despite the applicant's full compliance with the Commission's rules.[21] PRBA contends that any interference problems can be resolved as they develop, and states that it will provide information on station operations to Cornell on a regular basis. Finally, PRBA argues that Cornell cannot ask for protection from services that do not operate on radio astronomy frequencies because passive experiments such as are carried out by the Observatory, while scientifically useful, are not entitled to any protection from licensed radio services operating in accordance with the Commission's rules.

15. In its reply comments, Cornell states that it is essential that the Observatory be supplied technical information on new or modified radio operations that could adversely affect the Observatory's measurements in the same time frame as the applications for such operations are filed with the Commission, and that earlier coordination would be welcomed. Cornell contends that such earlier coordination would facilitate informal, good faith efforts to resolve anticipated interference. Additionally, Cornell states that the Observatory would carry out propagation and other calculations using standard industry-recognized procedures at no cost to the applicant. Cornell also contends that Section 1.1301 of the Commission's rules already requires an environmental assessment, and that the Puerto Rico Planning Board gives considerable attention to the radiation environment. Therefore, Cornell contends, requiring that an RF assessment be given to the Observatory is analogous to and no more burdensome than existing requirements.[22]

16. In reply to Stations, Cornell states that it is not attempting to exercise veto power over other services operating in Puerto Rico. Rather, it maintains that it is attempting to deal with the future interference environment in an efficient manner.[23] Cornell states that the Observatory is a member of the Puerto Rico Spectrum Users Group, which is open to all spectrum users on the island, and notes that coordination and information sharing schemes have been established over the years between the Observatory and other spectrum users.

17. In reply to SBE, Cornell states that the Observatory experiences interference across much of the spectrum up to 3 GHz.[24] Cornell claims that interference is an everyday occurrence even in bands allocated to the Radio Astronomy Service (RAS), and that passive experiments outside those bands are extremely difficult. Cornell asserts that the Observatory staff has had to inform a number of radio stations of faulty equipment that has created harmonic

[15] Mayor Castro Comments at 1-2.
[16] NRL Comments at 1. NRL's comments were filed by Kurt Weiler.
[17] SBE Comments at 1, 3-4.
[18] PRTC Comments at 6.
[19] Stations Comments at 2.
[20] 47 C.F.R. §2.1.
[21] PRBA Comments at 10.
[22] Cornell Reply at 2.
[23] *Id.* at 3.
[24] *Id.* at 5.

interference[25] to radio astronomy measurements. Cornell emphasizes that recognition in the Commission's rules of the existence of the Observatory coupled with the proposed notification requirement should be fully adequate to preserve the technical integrity of the Observatory's operations without significantly burdening other spectrum users.

18. *Proposal.* There is no question as to the importance and uniqueness of the Arecibo Observatory. Cornell's petition lists a long history of discoveries and accomplishments at the Observatory that may not have been achievable at any other location.[26] Given that the Observatory houses the largest and most sensitive radar/radio telescope in the world and the difficult radio frequency environment in which it operates, we are persuaded that special effort should be given to aid it in its coordination tasks. Due to its considerable size, terrain shielding is not as effective for minimizing interference to this facility as much as it is for smaller radio astronomy facilities. Also, unlike the Observatory, many radio astronomy observatories operate conjointly with other observatories for such applications as interferometry. Conjoint operations enable the detection and removal of interfering signals from the gathered data or observations. Due to the extremely high sensitivity of its antennas, however, the Observatory is used in a solo mode and, hence, its observational data cannot be post-processed as readily to remove interfering signals. Finally, we believe that Cornell has provided sufficient evidence to indicate that interference to the Observatory from various communications services is becoming an increasing problem.

19. Most of the comments opposing Cornell's petition recognize the Observatory's importance, but express concerns about the rights of service providers, including the possibility that their applications would be denied, that they would have to pay for additional interference avoidance modifications to facilities, and that the coordination requirement would be a burden to them. We believe that these concerns are overstated because, though we are proposing to afford the Observatory the right to be notified of an applicant's technical proposal, we are not proposing to afford the Observatory any additional interference protection nor are we altering the presumption that authorization of new radio communications services would best serve the public interest despite resultant increased interference to radioastronomical observations. Further, we are not proposing to require that the applicants bear the costs of interference avoidance which exceed those incurred through reasonable efforts to accommodate the Observatory.

20. We stress that we are not proposing to designate the area around the Observatory as a "Radio Quiet Zone," as is the case with the National Radio Astronomy Observatory (NRAO) in West Virginia. Puerto Rico's spectral environment is considerably congested and could not reasonably be designated a Quiet Zone. Additionally, the designation of a Quiet Zone affords these facilities the "maximum practicable protection from interference . . . without unduly disrupting existing radio services."[27] Protection of radioastronomy observations is entitled to increased weight in comparison to authorization of new service within a Quiet Zone.[28] In contrast, the proposed rules for the Arecibo Coordination Zone would not alter the presumption favoring new service authorization. They would simply provide for an exchange of information between applicants for the proposed services listed above and the Observatory in order to facilitate the avoidance of potential interference problems. Applicants for facilities in the Coordination Zone would be required only to make reasonable efforts to resolve potential interference problems with the Observatory and, once having met that requirement, could be licensed even if their facilities would cause additional interference to the Observatory. Their applications, unlike those subject to Quiet Zone rules, would not be subject to denial simply because they would interfere with radioastronomy operations.

21. We, therefore, propose to designate the Puerto Rican Islands as a "Coordination Zone," in which applicants for new or modified station facilities operating in accordance with the rule parts listed in paragraph 34, below, would be required to submit to the Observatory the technical parameters of the proposed service or modification no later than the date the application is filed with the Commission. The technical submission should include: 1) proposed frequency; 2) power; 3) antenna height; 4) antenna directivity and gain, if any; 5) geographic coordinates of the antenna; and 6) type of emission. In most cases, submission of a copy of the relevant technical portions of the application to the Observatory would suffice to meet this requirement. If the Observatory believes, based on interference analyses which it would perform at no cost to any applicant, that operations proposed in an application would cause harmful interference to the Observatory, the Observatory would attempt to reach an agreement with the applicant to avoid this interference. The applicant would be required to make reasonable technical modifications to its proposal in order to resolve or mitigate the potential interference problem and to file either an amendment to the application or a modification application if appropriate. Though the Observatory would have the same time period enjoyed by Quiet Zone observatories -- 20 days from the date of filing of an application[29] -- for submitting comments to the Commission regarding the application, we reiterate that it would not enjoy the same level of interference protection afforded those observatories. Once an applicant has satisfied its responsibility of making reasonable efforts to accommodate

[25] A sinusoidal wave has several components or harmonics, which occur at frequencies that are an integral multiple of the frequency of the wave. The first harmonic is the fundamental frequency itself, the second harmonic is a signal at twice the frequency of the fundamental, the third harmonic is a signal at three times the frequency of the fundamental, etc.

[26] Some examples of the Observatory's accomplishments include detailed radar maps of Venus, precise pulsar measurements demonstrating the existence of gravitational radiation and of planets, and observations of hydrogen molecules in galaxies far beyond the Milky Way. Cornell Petition, Att. B (Technical Statement) at 2. We also note that the Observatory is important to the economy of Puerto Rico because it is a major tourist attraction.

[27] *See Report and Order,* FCC 58-1111, 17 RR 1738, 1739 (1958).

[28] *See Achernar Broadcasting Co.,* 6 FCC Rcd. 5393, 5394 (1991), *remanded* 62 F.3d 1441 (1995) (failure to weigh entire record).

[29] *See, e.g.,* 47 C.F.R. § 73.1030(a). Although Cornell changed its original request for a comment period of 20 days to a period of 30 days, see note 5, *supra,* we are proposing a 20-day period in order to maintain procedural consistency with our existing rules relating to other radioastronomy observatories.

the Observatory, its application may be granted even if the Observatory would suffer additional interference as a result.

22. We believe that our proposal will encourage advance coordination between the Observatory and Commission applicants. However, we request comment on this approach or any alternative approaches. Commenters should address whether the proposed 20-day period for filing comments is adequate or whether some other period would be superior. We also solicit comment on whether the applicants should be required to notify the Observatory of their technical parameters at an earlier time, for example, 20 days before the application is filed with the Commission. This approach might facilitate early coordination which could prevent the necessity of filing either amendments to applications or additional modification applications with the Commission. However, this approach would require applicants to divulge, in advance of filing, information which they may wish to keep confidential until the application is filed. We observe that, in any event, the proposed requirement of notification simultaneous with application filing would not preclude an applicant from notifying and coordinating with the Observatory at any earlier time, should it choose to do so.

B. *Interference Evaluation and Resolution Procedures*

23. *Comments.* Several entities argue that Cornell fails to explain the procedures the Observatory would use to evaluate interference from radio facilities in the Puerto Rico Islands. Specifically, the American Radio Relay League, Inc. (ARRL) and SBE argue that Cornell does not propose technical criteria for evaluation of an application, and PRTC expresses concern that the Observatory may oppose the grant of all applications that cause any radio noise to it at any location in the frequency spectrum. PRTC argues that such privileges would be excessive, and states that, as a comparison, the Department of Commerce's Observatory at Table Mountain, Colorado is protected from only those radio facilities that generate a specified amount of noise.[30] Further, PRTC argues that the Table Mountain Observatory can veto construction of radio facilities only within 1.5 miles of its location. PRTC and Stations question why a protection zone similar to Table Mountain's would not suffice for the Observatory.[31]

24. SBE states that Cornell's Petition is unclear about the Observatory's obligation to attempt to informally resolve interference concerns. Additionally, SBE maintains that the Observatory should have no grounds for objecting to a broadcast operation if the broadcast signal is suppressed to the degree specified in the Commission's rules. However, SBE does not object to use of additional filters to meet suppression standards beyond those specified in the rules, if the Observatory pays for these filters.

25. Similarly, PRBA claims that Cornell's suggestion that the Observatory will work with applicants to find alternatives to reduce interference fails to take into consideration economic considerations in planning a broadcast facility, such as lack of available land, the protective contours of other broadcast stations, and spectrum congestion.[32] PRBA therefore contends that, contrary to Cornell's assumption, there are few alternatives available to broadcasters. Finally, PRBA asserts that Cornell's proposal places all obligation for resolution of alleged or anticipated interference upon the applicant, whereas fairness dictates that the Observatory accept the cost of interference resolution.

26. In reply comments, Cornell states that different standards must be used to evaluate a station's potential for interference, depending on the band, type of interference, and proximity to the Observatory. Cornell says that in general filtering and modification of the beam pattern are useful in reducing interference, but that specific standards would be overly complex. Cornell also contends that the Observatory is flexible and does not seek to use all frequencies at all times. For example, it says that the Observatory frequently makes measurements at night when some broadcast stations are off the air, and that more formal time-sharing could be implemented.

27. *Proposal.* We agree with Cornell that, because of the multitude of services that may cause harmful interference to the Observatory at various distances, specifying precise interference standards would be difficult, and may not be desirable. We recognize that the Observatory's equipment is extremely sensitive and many station operations may have a potential for interference, depending on their proximity to the Observatory. We believe that the Observatory will make a good faith effort to evaluate the potential for interference based on all relevant factors and will cooperate with the licensees to assure minimum disruption or inconvenience to all concerned. Thus, we are not proposing to amend our rules to add specific interference standards applicable to the Observatory. We request comment on this approach and, alternatively, on whether we should establish specific interference criteria that the Observatory would use.[33]

C. *Affected Services*

28. *Petition and Comments.* In its Petition, Cornell requests that all applicants requesting new station licenses or modification to existing stations in the Puerto Rican Islands under Parts 5, 21, 22, 23, 25, 73, 74, 78, 80, 87, 90, 94, 95, and 97 be required to send technical information to the Observatory.[34] Cornell specifically proposes that we require all amateur repeater and automatically controlled beacon operations within the Coordination Zone to coordinate with the Observatory prior to establishing service. However, several commenters oppose the scope of the proposed rules. Specifically, PRBA contends that there is no frequency limitation on the proposal, so that all Puerto Rico radio stations that fall under the above rule parts would have to give notification. PRBA and Stations also state that short-term temporary broadcast auxiliary operations should

[30] PRTC Comments at 4.

[31] Stations Comments at 6.

[32] PRBA Comments at 9.

[33] We note that in MM Docket No. 95-17, we have proposed technical standards for protecting thirteen radio astronomy sites, including the Arecibo Observatory, where TV Channel 37 frequencies (608-614 MHz) are used for radio astronomy observations. Those proposed standards address potential first-adjacent channel interference caused by TV stations operating on Channels 36 and 38. *See Notice of Proposed Rule Making* ("Radio Astronomy Activity on Channel 37"), 10 FCC Rcd 2088 (1995). Our instant proposal to create a Coordination Zone is not intended to supplant the rulemaking proceeding in MM Docket No. 95-17.

[34] See note 3, *supra,* for services which Cornell proposes to exclude from this requirement.

not be subject to prior notification restrictions. Stations indicates that such operations typically operate with low power (1-10 watts) and therefore are unlikely to cause interference. Stations and PRBA also argue that short-term auxiliary operations are necessary during times of emergency and other unanticipated situations. Stations further contend that the need for notification for radio operations 40 or more miles away from the Observatory has not been demonstrated.

29. SBE states that it does not object to a notification requirement for short-term broadcast auxiliary operations, but contends that it should be limited to the 4-mile radius of the Puerto Rico Protection Zone. SBE states that outside this area, short-term operations should continue to be permitted without restriction. SBE states that if prior notification for short-term operations is required, the Observatory should implement a 24-hour hotline. In addition, SBE contends that there is no need to include 18 GHz broadcast auxiliary or 23 GHz private operational fixed services in the notification process. SBE contends that because these services operate only at powers below 1 watt with directional antennas, they have no radiation that threatens the Observatory, which has capabilities only to 12.2 GHz.

30. ARRL argues that Cornell does not allege that amateur stations have interfered or will interfere with the Observatory's operations. ARRL also argues that Cornell's Petition does not contain sufficient engineering information to determine the extent of any potential interference. ARRL also argues that amateur operations provide emergency communications systems and that such operations should not be restricted. Accordingly, ARRL recommends that the Observatory coordinate informally with the local amateur repeater coordinator.

31. In its reply comments, Cornell modifies its proposal to ask that we require prior notification to the Observatory only for those short-term broadcast auxiliary applicants whose operations would be within the 4-mile radius of the Protection Zone. Cornell acknowledges that emergency circumstances may not allow prior coordination of every short-term temporary operation, but requests that notification be made to its personnel which are on duty 24 hours a day to answer the phone or receive a fax. Cornell argues that this would permit the Observatory to modify its schedule if there is a potential for interference. Cornell argues that in the absence of such notification, scientists may travel great distances only to be unable to use the Observatory on an interference-free basis.

32. Also in its reply, Cornell agrees with the ARRL that conflicts with amateur operations have always been amicably resolved through personal contact. In supplemental reply comments, Cornell states that it has come to an agreement with the Puerto Rico Amateur Radio League (PRARL). Cornell states that the PRARL will provide the Observatory access to its files on relay and beacon systems and that the Observatory is willing to rely on the goodwill of the PRARL for frequency coordination. Additionally, Cornell asks that we require that only new repeater and beacon stations within a distance of 10 miles of the Observatory be coordinated. Cornell indicates that the officials of the PRARL have agreed in principle to these modified proposals.

33. Finally, in reply to the SBE, Cornell indicates that the spectrum range of the Observatory will eventually include frequencies up to 15 GHz, and that the possibility of future upgrades to higher frequencies renders it prudent for the Observatory to monitor applications for those frequencies also.

34. *Proposal.* We believe that the sensitivity of the Observatory's equipment and the many types of services that could cause interference to it necessitates that applicants for Part 5, 21, 22, 23, 24, 25, 26, 73, 74, 78, 80, 87, 90, 94, 95 and 97 services[35] in the Coordination Zone, with certain exceptions as discussed below, notify the Observatory of their proposed operations. We do not believe that it will be overly burdensome for these parties to send the relevant technical information or a copy of the technical portion of their applications to the Observatory when they submit them to the Commission or to make reasonable modifications to the application to accommodate the Observatory. However, we request comment on whether there may be a more efficient alternative approach. Commenting parties that believe that services other than those discussed below should be excluded from this process should list these services and specify the reason(s) for exclusion. In addition, we solicit comment on whether notification requirements should be imposed on any other licensed service not covered in the above rule parts.

35. We are not proposing a notification requirement for applicants for mobile stations in land mobile radio services (only fixed base stations), temporary base or temporary fixed stations (other than short-term broadcast auxiliary operations discussed below), the Civil Air Patrol, new amateur stations (other than amateur beacon and repeater stations discussed below), mobile Earth terminals licensed under Part 25, or stations aboard ships or aircraft.[36] Coordination procedures for these facilities would be unreasonably burdensome, and any interference caused by them to the Observatory would tend to be transient. We are also not proposing to require notification to the Observatory for radio facilities that use frequencies above 15 GHz. While we may revisit this issue in the future, at present the Observatory does not use such frequencies. Accordingly, we do not see a reason for licensees of such operations to notify the Observatory.

36. We are proposing to adopt Cornell's revised proposal regarding short-term temporary broadcast auxiliary operations. That is, operators of proposed short-term radio services within the Coordination Zone would be required to notify the Observatory in advance of their proposed operations, except in emergency situations. Further, prior coordination with the Observatory of short-term operations within the 4-mile Protection Zone would be required, except in emergency situations. In emergency situations, we propose to require that notification be accomplished as soon as possible after operations begin. Finally, we propose to require that amateur licensees proposing to operate new beacon and repeater stations within 10 miles of the Observatory to notify the Observatory, as the PRARL and the

[35] We note that rule parts for Personal Communications Services at Part 24 and General Wireless Communications Services at Part 26 did not exist when Cornell filed its petition.

[36] See note 3, *supra* (Cornell generally agrees with these exclu-

Observatory have tentatively agreed.[37] The record indicates a history of cooperation between amateur operators and the Observatory, and we believe they will continue to coordinate successfully.

37. We note that many Part 90 private land mobile licensees are small businesses, for which a minimization of additional regulatory burdens is particularly appropriate. We therefore request comment on whether it would be a better, less burdensome alternative to impose the notification requirement with regard to base or fixed stations upon the Part 90 frequency coordinators rather than the licensees.[38]

38. We solicit comment on our proposals. Commenters should address the adequacy and sufficiency of these rules, whether there is an even less burdensome manner to achieve the goals of this rulemaking, whether notification requirements are needed for other services which are not included in the proposed rules, and whether some services listed in the proposed rules need not be included therein.

39. To assist commenters in addressing our proposal, we point out that the new rules pertinent to the Arecibo Observatory could be drafted in a format similar to the existing rules which relate to the NRAO. The rules, however, would also specify explicitly that an applicant's responsibility is to make reasonable efforts to accommodate the Arecibo Observatory. For example, Section 90.177 could be amended by adding the following language:

> Any applicant for a new permanent base or fixed station to be located on the islands of Puerto Rico, Desecheo, Mona, Vieques, and Culebra, or for a modification of an existing authorization which would change the frequency, power, antenna height, directivity, or location of a station on the islands of Puerto Rico, Desecheo, Mona, Vieques, and Culebra, shall notify the Interference Office, Arecibo Observatory, Post Office Box 995, Arecibo, Puerto Rico 00613, as appropriate, in writing, of the technical parameters of the proposal.
>
> (1) The notification to the Interference Office, Arecibo Observatory shall be made prior to, or simultaneously with, the filing of the application with the Commission. The notification shall state the geographical coordinates of the antenna, antenna height above ground, antenna directivity and gain, proposed frequency, type of emission, and effective radiated power. Generally, submission of the information in the technical portion of the FCC license application is adequate notification. In addition, the applicant shall indicate in its application to the Commission the date notification was made to the Arecibo Observatory.
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> (2) After receipt of such applications, the Commission will allow a period of 20 days for comments or objections in response to the notification indicated. The applicant would be required to make reasonable efforts in order to resolve or mitigate any potential interference problem with the Arecibo Observatory and to file either an amendment to the application or a modification application if appropriate. Once an applicant has satisfied its responsibility to make reasonable efforts to accommodate the Observatory, its application may be granted even if the Observatory would suffer additional interference as a result.
>
> (3) The provisions of this paragraph do not apply to applications for mobile, temporary base, temporary fixed stations, or to operations which will transmit on frequencies above 15 GHz.

IV. PROCEDURAL INFORMATION

Initial Regulatory Flexibility Analysis -- Notice of Proposed Rulemaking

40. Pursuant to the Regulatory Flexibility Act of 1980, the Commission finds as follows:

A. Reason for Action

This action is being initiated in response to a Petition for Rulemaking filed by Cornell University. The proposed action should facilitate coordination between the Arecibo Observatory and Commission licensed services in the Commonwealth of Puerto Rico.

B. Objective

The objective of this proposal is to establish a Coordination Zone on Puerto Rico in which Commission license applicants must provide the Arecibo Observatory with technical information so that the Observatory may perform interference analysis. This proposed action is also intended to encourage early informal coordination between the Observatory and spectrum users as well as increase the awareness of the Observatory and its operations with other spectrum users.

C. Legal Basis

The proposed action is authorized by Sections 4(i), 303(c), 303(f), 303(g), 303(r) and 309(j)(13) of the Communications Act of 1934, as amended, 47 U.S.C. Section 154(i), 303(c), 303(f), 303(g), 303(r), and 309(j)(13).

D. Description, Potential Impact, and Number of Small Entities Affected

The proposed action would require applicants for new or modified radio communication facilities on the islands of Puerto Rico, Desecheo, Mona, Vieques, and Culebra within the Commonwealth of Puerto Rico to submit sufficient technical information concerning their proposed service to enable the Arecibo Observatory, which is part of the National Astronomy and Ionosphere Center, located near Arecibo, Puerto Rico, to determine the potential for interference with the Observatory's operations. The Observatory would perform interference evaluations at no cost to the applicants. The proposal would also require applicants to make reasonable attempts to resolve or mitigate potential interference problems in

sions).

[37] We note that such operations are authorized for all amateur radio licensees generally without additional application.

[38] "Frequency Coordinator" is defined as "an entity or organization that has been certified by the Commission to recommend frequencies for use by licensees in the Private Land Mobile Radio Service." 47 C.F.R. § 90.7.

order to protect the Observatory. As such, the proposal would impose a minor paperwork burden on such applicants and a potential burden to modify their applications in order to avoid potential interference problems. However, applicants would not be responsible for bearing the costs of interference avoidance which exceed those incurred through reasonable efforts to accommodate the Observatory. The proposal would enable the Observatory and applicants to coordinate and share information in order to avoid harmful interference to sensitive, nationally important radio astronomy operations.

E. Reporting, Record Keeping and other Compliance Requirements

None.

F. Federal Rules which Overlap, Duplicate or Conflict with this Rule

None.

G. Significant Alternatives

We invite comment on any alternative proposals.

H. Initial Paperwork Reduction Act of 1995 Analysis

This NPRM contains either a proposed or modified information collection. As part of its continuing effort to reduce paperwork burdens, we invite the general public and the Office of Management and Budget (OMB) to take this opportunity to comment on the information collections contained in this NPRM, as required by the Paperwork Reduction Act of 1995, Pub. L. No. 104-13. Public and agency comments are due 60 days from date of publication of this NPRM in the Federal Register. Comments should address: (a) whether the proposed collection of information is necessary for the proper performance of the functions of the Commission, including whether the information shall have practical utility; (b) the accuracy of the Commission's burden estimates; (c) ways to enhance the quality, utility, and clarity of the information collected; and (d) ways to minimize the burden of the collection of information on the respondents, including the use of automated collection techniques or other forms of information technology.

General -- Notice of Proposed Rulemaking

41. The rule making proposals in the *Notice of Proposed Rulemaking* constitute a non-restricted notice and comment rule making proceeding. *Ex parte* presentations are permitted, except during the Sunshine Agenda period, provided they are disclosed as provided in Commission rules. *See generally* 47 C.F.R. §§ 1.1202 , 1.1203, and 1.1206(a).

42. Pursuant to applicable procedures set forth in Sections 1.415 and 1.419 of the Commission's rules, interested parties may file comments on or before **April 1, 1996,** and reply comments on or before **April 16, 1996.** All relevant and timely comment will be considered by the Commission before final action is taken in this proceeding. To file formally in this proceeding, participants must file an original and four copies of all comments, reply comments, and supporting comments. If participants want each Commissioner to receive a personal copy of their comments, an original plus nine copies must be filed. Comments and reply comments should be sent to Office of the Secretary, Federal Communications Commission, Washington, D.C. 20554. Comments and reply comments will be available for public inspection during regular business hours in the FCC Reference Center (Room 239) of the Federal Communications Commission, 1919 M. Street, N.W., Washington, D.C. 20554.

43. Written comments by the public on the proposed and/or modified information collections are due **April 1, 1996.** Written comments must be submitted by the Office of Management and Budget (OMB) on the proposed and/or modified information collections on or before 60 days after date of publication in the Federal Register. In addition to filing comments with the Secretary, a copy of any comments on the information collections contained herein should be submitted to Dorothy Conway, Federal Communications Commission, Room 234, 1919 M Street, N.W., Washington, DC 20554, or via the Internet to dconway fcc. gov and to Timothy Fain, OMB Desk Officer, 10236 NEOB, 725 - 17th Street, N.W., Washington, DC 20503 or via the Internet to fain_t al. eop. gov.

44. For further information concerning this rule making, contact Tom Derenge at (202) 418-2451, e-mail address "tderenge fcc. gov", Office of Engineering and Technology, Federal Communications Commission, Washington, D.C. 20554.

FEDERAL COMMUNICATIONS COMMISSION

William F. Caton
Acting Secretary

APPENDIX: COMMENTING PARTIES

Comments to Arecibo Petition for Rulemaking RM-8165

The American Radio Relay League, Incorporated

The Asociacion De Radiodifusores De Puerto Rico

California Institute of Technology

Center for Astrophysics

City of Arecibo

City of Hatillo

Come now Radio Aeropuerto, Inc. & South Puerto Rico Broadcasting Corp

Cornell University

Kurt W. Weiler, Head, Interferometric Research Section, Naval Research Laboratory

Five College Radio

The Governor of Puerto Rico

Harvard-Smithsonian

National Radio Astronomy Observatory (Morton S. Roberts)

National Research Council-Commission on Physical Sciences, Mathematics, and Applications

Puerto Rico Telephone Company

Radio Aeropuerto, Inc.

SETI Institute

The Society of Broadcast Engineers, Inc.

Yervant Terzian-Cornell University Department of Astronomy

University of California

University of Iowa

University of Massachusetts

University of Texas

Reply Comments

Asociacion De Radiodifusores De Puerto Rico

Cornell University

Late-Filed Comments

Cornell University Late Filed Supplemental Comments

The Asociacion De Radiodifusores De Puerto Rico Late Filed Comments