Before the
FEDERAL COMMUNICATIONS COMMISSION FCC 94-265
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of the Commission's Rules to	)	GEN Docket No. 90-314
Establish New Personal Communications	)	RM-7140, RM-7175, RM-7618
Services	)	

THIRD MEMORANDUM OPINION AND ORDER

Adopted: October 19, 1994; Released: October 19, 1994

By the Commission:

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I. INTRODUCTION AND EXECUTIVE SUMMARY

1. By this order we amend in minor respects our broadband Personal Communications Services ("PCS") regulatory structure to better achieve the four primary goals of this proceeding: competitive delivery, a diverse array of services, rapid deployment, and wide-area coverage. We take this action in response to ten petitions for reconsideration or clarification of the policies and rules we adopted in a June 1994 Memorandum Opinion and Order in this proceeding.[1] We first summarize the petitions and our disposition of them.

2. Comcast Corporation ("Comcast") and the Cellular Telecommunications Industry Association ("CTIA") ask us to alter rules that determine the extent to which entities holding substantial ownership interests in cellular licenses also may hold 30 MHz PCS licenses in overlapping cellular and PCS service areas. We deny these petitions. Our goals for PCS reflect a balance of numerous considerations, including affirmatively promoting competition as well as preventing anticompetitive behavior in the auction process and the PCS marketplace. The petitioners offer no persuasive rationale for changing our rules to reflect a different balance. The record persuades us, however, to modify those rules in one respect. We will permit entities with attributable, but non-controlling cellular interests to bid on in-market 30 MHz PCS licenses, subject to post-auction divestiture of their non-compliant cellular interest in order to remain in compliance with our cellular/PCS cross-ownership rules. This modification furthers our policy of maximizing opportunities for cellular participation in PCS while safeguarding the PCS market and the auction process against the potential for anticompetitive conduct.

3. The Personal Communications Industry Association ("PCIA") requests that we adopt rules requiring PCS licensees to share the cost of relocating microwave licensees operating in the 1850-1990 MHz PCS bands. PCIA's cost sharing proposal is incomplete, and we believe that its adoption might hamper potential bidders' efforts to value spectrum accurately as well as generate litigation before this Commission to resolve ambiguous aspects. Further, we believe a more complete record is necessary for us to fully evaluate the costs and benefits of the proposal and to consider additional, related aspects. For these reasons we deny PCIA's petition without prejudice. PCIA or other interested parties may submit a separate petition for rulemaking to address this subject if they desire to do so.

4. Point Communications Company ("Point") requests that PCS service areas be based on Department of Commerce BEA Economic Areas" ("BEAs"), rather than Major Trading Areas ("MTAs") and Basic Trading Areas ("BTAs"). Point also requests that entrepreneur block spectrum be varied from market to market and that we make all PCS licensees subject to Open Network Architecture ("ONA") regulation. We deny these requests. The record provides no persuasive basis for concluding that greater public interest benefits will result from switching

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[1] See Memorandum Opinion and Order, FCC 94-144, June 13, 1994, *summarized* 59 FR 32820 (June 24, 1994); Erratum, GEN Docket No. 90-314, Mimeo Number 44006 (released July 22, 1994) (hereafter jointly Broadband PCS Reconsideration). Appendix B lists parties that filed petitions for reconsideration, oppositions or comments, and replies.

PCS service areas from MTAs/BTAs to BEAs. Point's claim that varying entrepreneur block spectrum will benefit small entities by forcing large PCS providers to develop technologies and equipment for all bands also is unpersuasive. Adopting Point's proposal likely will harm licensees by making the PCS market unnecessarily complex from technical and operational standpoints. Finally, whether ONA regulation is appropriate for the PCS marketplace is outside the scope of this proceeding.

5. The Puerto Rico Telephone Company ("PRTC") requests that we reverse our decision to establish two separate BTAs in Puerto Rico. The record does not convince us that Puerto Rico is a single economic unit, as PRTC claims, and we deny its petition. We note that this decision does not preclude a party from aggregating the two Puerto Rico BTAs into a single service area.

6. The Association of Independent Designated Entities ("AIDE") requests that we clarify PCS licensees' rights to use of the terms MTA and BTA, which are subject to copyrights held by Rand McNally. In particular, AIDE asks that we determine whether the substance of certain correspondence between AIDE and Rand McNally regarding the use of those terms, which was entered into the record of this proceeding by AIDE, comports with our decision to employ the terms to denote PCS service areas. In effect, AIDE asks us to render an adjudicatory-type advisory opinion about the meaning of a licensing agreement between Rand McNally and other commercial interests regarding the use of MTA/BTA terminology. We decline to address this issue. It is our practice not to render such opinions, particularly in rulemaking proceedings, and the record provides no basis for departing from that practice here.

7. Spatial Communications, Inc. and ArrayComm, Inc. (jointly "SCI/ArrayComm"), and Omnipoint Corporation ("Omnipoint") seek changes to and clarification of various technical PCS rules. SCI/ArrayComm's understanding that base station transmitter output power limits apply to each individual antenna comports with our interpretation, and we grant its petition to that extent. We deny without prejudice SCI/ArrayComm's request to express limits on transmitted power in terms different from those in our existing rules because that request is not sufficiently developed to allow consideration of all its implications. We also deny Omnipoint's request to modify the emission mask for the licensed bands, employing a mask similar to that used for unlicensed isochronous PCS devices. Adoption of this mask could result in greatly increased out-of-band emissions levels in the adjacent frequency blocks to the detriment of the license holder in those bands. We are, however, amending the rules to specify a new measurement procedure in the 1 MHz frequency blocks immediately adjacent to, and outside of, the licensee's frequency block. This new procedure permits the use of a measurement resolution bandwidth of 1 percent, or greater, of the emission bandwidth of the device under test. We are adopting Omnipoint's request to permit a frame period of 20 milliseconds in the unlicensed isochronous sub-band. However, we are not adopting their request to require all devices operating in that sub-band to use a listen before talk monitoring interval of 20 milliseconds.

8. A coalition of broadcast interests (hereinafter "MSTV")[2] requests that we impose special operating requirements on PCS licensees operating in Block C, in order to protect adjacent channel broadcast auxiliary service ("BAS") receiver sites. This block is reserved for designated entities. We deny this request because existing rules are adequate to safeguard such operations.

9. Cellsat, Inc. ("Cellsat") asks that PCS Blocks F and C (1970-1990 MHz) be allocated domestically for Mobile Satellite Service ("MSS") on a secondary basis, and that the 2160-2180 MHz band be allocated domestically for MSS on a primary basis, in order to create an opportunity for hybrid terrestrial-satellite operations on those frequencies. We deny Cellsat's request because our MSS proceeding is a more appropriate forum to consider these issues. [3]

II. BACKGROUND

10. On June 9, 1994, in response to 67 petitions for reconsideration of the Second Report and Order in this proceeding,[4] we adopted the Broadband PCS Reconsideration decision that allocated 120 MHz for licensed broadband PCS and 20 MHz for unlicensed PCS devices in the 1850-1990 MHz band and provided service rules for the operation of this service and equipment.[5] We revised the allocation plan to significantly lower equipment costs, lower the cost of relocating incumbent users, simplify spectrum aggregation, and preserve spectrum for worldwide MSS operations.[6] We also adopted a band plan that provides for three 30 MHz licenses (Blocks A, B, and C) and three 10 MHz licenses (Blocks D, E, and F), all of which are within the 1850-1990 MHz band. We provided that the A and B Blocks be licensed within 51 service areas based on the Major Trading Areas (MTAs) and that the C, D, E, and F Blocks be licensed within 493 smaller service areas based on the Basic Trading Areas (BTAs) set forth in the 1992 Rand McNally Commercial Atlas & Marketing Guide.[7]

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[2] The parties to this petition for reconsideration are: Maximum Service Television, Inc., Capital Cities/ABC, Inc., CBS Inc., Fox Inc. & Fox Broadcasting Stations, Inc., the National Association of Broadcasters, Inc., National Broadcasting Company, Inc., Public Broadcasting Service, the Radio-Television News Directors Association, and the Society of Broadcast Engineers.

[3] See Broadband PCS Reconsideration, supra n.1 at para. 97.

[4] Second Report and Order, GEN Docket No. 90-314, 8 FCC Rcd 7700 (1993)(hereafter PCS Second Report and Order).

[5] See Broadband PCS Reconsideration, supra n.1. Previously in this proceeding we adopted: Notice of Inquiry, 5 FCC Rcd 3995 (1990); Policy Statement and Order, 6 FCC Rcd 6601 (1991); Notice of Proposed Rule Making and Tentative Decision, 7 FCC Rcd 5676 (1992); Erratum, 7 FCC Rcd 5779 (1992); Second Report and Order, 8 FCC Rcd 7700 (1993).

[6] See PCS Reconsideration Order at para. 27.

[7] See id. at para. 75.

11. We reduced the allocation for unlicensed PCS devices to 20 MHz at 1910-1930 MHz, but committed to initiating a proceeding in the near future to examine allocation of additional spectrum for unlicensed PCS operations. Within this band, we adopted a 1.25 MHz channelization scheme for isochronous (voice) devices and eliminated channelization requirements for asynchronous (data) devices.

12. Additionally, we continued to permit all eligible entities to acquire PCS spectrum up to a cap of 40 MHz. We retained our five percent equity attribution threshold for PCS licenses, so that the same entity may not own more than five percent of PCS licenses holding more than 40 MHz within the same area. We also retained our cellular attribution threshold of 20 percent equity ownership of a cellular licensee and our service area overlap test of 10 percent of the population of the relevant PCS market, so that the same entity generally may not own more than 20 percent of the cellular license and more than 5 percent of PCS license(s) that would place the entity above the spectrum limit in an overlapping service area. We relaxed the eligibility rules to permit entities with attributable interests in cellular companies whose combined cellular geographic service areas (CGSAs) overlap between 10 and 20 percent of the PCS service area population to submit bids for more than 10 MHz of PCS spectrum provided that, prior to the auction, they commit to divest themselves of sufficient cellular interests to come into compliance with our eligibility rules within 90 days of license grant.

13. We provided that stock, partnership and other financial interests and relationships will be considered in determining attributable interests for purposes of our PCS spectrum caps. We raised from a 20 percent to a 40 percent non-controlling interest the threshold for determining attributable cellular equity ownership for rural telephone companies, small businesses, and businesses owned by minorities and women, which collectively are termed "designated entities" in our rules implementing 47 U.S.C. § 309(j). We increased from a 20 percent to a 40 percent non-controlling interest the threshold for determining attributable cellular equity ownership to allow non-designated entities to make non-controlling investments in PCS licenses owned and controlled by minority- and women- owned businesses. We permitted entities with attributable cellular interests covering 10 or more percent of the population in a PCS service area to acquire 10 MHz of PCS spectrum within the PCS service area and, after January 1, 2000, to acquire an additional 5 MHz for a total of 15 MHz of PCS spectrum in their cellular service areas. We pledged to examine management contracts and spectrum leases in the CMRS docket for the purpose of determining whether other interests in PCS licenses should be limited in order to foster vigorous competition.

14. Further, we relaxed construction requirements to provide that (a) 30 MHz broadband PCS licensees must provide coverage to one-third of their service area population within five years of initial licensing and two-thirds within ten years and (b) 10 MHz licensees must provide coverage to twenty five percent of their service area population within five years of initial licensing, or submit a showing of equivalent or substantial service. We increased the maximum power level permitted for broadband PCS base stations to 1640 watts equivalent isotropically radiated power (e.i.r.p.), which is equivalent to 1000 watts effective radiated power (e.r.p.). We retained with minor amendment rules ensuring compliance with minimum standards for exposure

to radio frequency (RF) energy emitted by PCS devices. We committed to initiate a proceeding in the near future to allocate additional spectrum for MSS and to work toward having additional spectrum allocated to MSS at the World Radio Conference to be held in 1995 (WRC-95).

15. Previously, we adopted a Second Report and Order in the regulatory treatment of mobile services proceeding that concluded, inter alia, that broadband PCS is presumptively a commercial mobile radio service (CMRS).[8] In the emerging technologies proceeding we also adopted rules that subject all incumbent facilities in the 1850-1990, 2110-2150, and 2160-2200 MHz bands to mandatory relocation if an emerging technology provider, e.g., a PCS licensee, requires the spectrum.[9]

16. Subsequent to adopting the MO&O, we adopted a Fifth Report and Order in the competitive bidding proceeding that establishes the service specific rules for selecting broadband PCS[10] licensees and adopted a Further Order on Reconsideration in the instant proceeding that amended our PCS attribution rules to employ a "multiplier" to determine how interests in cellular and broadband PCS licensees held indirectly through intervening corporate entities should be attributed.[11]

III. DISCUSSION

A. Attribution and Cellular Eligibility

17. In the Broadband PCS Reconsideration, we retained our five percent equity attribution threshold for broadband PCS licenses so that the same entity may not own five or more percent

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[8] PCS providers, however, may offer private PCS service if they demonstrate a reasonable basis for overcoming the CMRS presumption. Additionally, local exchange carriers (LECs) are required to provide reasonable and fair interconnection for all CMRS providers, including PCS licensees. See Second Report and Order, GEN Docket No. 93-252, 9 FCC Rcd 1411 (1994)(hereafter CMRS Second Report and Order), petitions for reconsideration pending.

[9] See Memorandum Opinion and Order, ET Docket No. 92-9, 9 FCC Rcd 1943 (1994), petition for reconsideration pending. The emerging technologies proceeding, ET Docket No. 92-9, established the transition rules that PCS licensees and UTAM, Inc. will employ to gain use of spectrum currently being used by point-to-point microwave facilities. Previously in ET Docket No. 92-9, we adopted: First Report and Order and Third Notice of Proposed Rule Making, 7 FCC Rcd 6886 (1992); Second Report and Order, 8 FCC Rcd 6495 (1993); and Third Report and Order and Memorandum Opinion and Order, 8 FCC Rcd 6589 (1993), on reconsideration, 9 FCC Rcd 1943 (1994).

[10] See Fifth Report and Order, PP Docket No. 93-253, FCC 94-178 (Released July 15, 1994).

[11] See Further Order on Reconsideration, GEN Docket No. 90-314, FCC 94-195, released July 22, 1994, *summarized* 59 FR 39704 (August 4, 1994), petition for reconsideration pending.

of licenses constituting more than 40 MHz within the same area. In the Further Order on Reconsideration, we implemented a "multiplier" to determine when non-controlling interests in cellular and broadband PCS licensees held indirectly through intervening corporate entities should be attributed.[12] We also retained our cellular attribution threshold of 20 percent equity ownership of a cellular licensee and our service area overlap test of 10 percent of the population of the relevant PCS market, so that an entity wishing to participate fully in PCS generally may not own more than 20 percent of a cellular license, and not more than 5 percent of a PCS license(s), that would place the entity above the spectrum limit in an overlapping service area. However, we raised the threshold for attributing non-controlling cellular ownership for rural telephone companies, small businesses, and businesses owned by women and minorities from a 20 percent to a 40 percent interest .[13] We relaxed the eligibility rules to permit entities with attributable interests in cellular companies whose combined CGSAs overlap between 10 and 20 percent of the PCS service area population to apply for more than 10 MHz of PCS spectrum provided that, prior to the auction, they commit to divest themselves of sufficient cellular interests to come into compliance with our eligibility rules within 90 days of license grant.[14]

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[12] For example, if Party A owns 10 percent of Company X, which owns 35 percent of, and controls, Company Y, which owns 25 percent of Licensee Z, then Company X's attributable interest would be 25 percent (100% x 25%) and Party A's effective interest would be 2.5 percent (10% x 100% x 25%). However, if Company X owns 35 percent of, but does not control, Company Y, then Company X's effective interest would be 8.75 percent (35% x 25%) and Party A's effective interest would be 0.875 percent (10% x 35% x 25%).

[13] See Broadband PCS Reconsideration at paras. 102-140.

[14] See id. at paras. 141-146.

Positions of the Parties

18. The Cellular Telecommunications Industry Association (CTIA) requests that the cellular-PCS ownership attribution standard be increased from 20 percent to 30-35 percent and that the population overlap standard be increased from 10 to 40 percent. CTIA claims that these higher limits would ensure competition without risking inadvertent harm to a nascent industry,[15] basing its claim on an antitrust market analysis it presented with a previous petition for reconsideration.[16] CTIA also presents an analysis of the impact of the population overlap standard on entities with attributable cellular interests in the top fifty BTAs, and in thirty other BTAs. Using these data as a baseline, the analysis purports to show how the number of entities barred from holding a 30 MHz in-market license under the current 10 percent overlap standard decreases as that percentage is increased to sequentially higher levels (*i.e.,* 20, 25, 30, 35, 40 percent). According to CTIA, the beneficiaries of raising the overlap standard would be "small cellular carriers" that are prevented by the current standard from "deliver[ing] on the promise of the information age to rural and small town America.[17]

19. Additionally, CTIA requests that the 35 MHz PCS cap be immediately raised to 40 MHz. If the Commission is not willing to immediately eliminate the 35 MHz cap, CTIA suggests that the cap be raised to 40 MHz one year after actual inauguration of services by a new PCS entrant in the relevant PCS service area.[18] Finally, CTIA requests that post-auction divestiture be made available to all cellular providers regardless of the degree of geographic overlap, instead of limiting post-auction divesture to cellular providers with a 10-to-20 percent overlap.[19]

20. Comcast Corporation (Comcast) requests that the attribution standard for purposes of cross-ownership and aggregation of spectrum be increased from 5 to 20 percent, provided that no more than a five percent voting interest is held, and the attribution standard be increased to 25 percent in publicly traded corporations, provided that no more than a 15 percent voting interest is held.[20] Comcast argues that the Commission has recognized that parties holding more than a five

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[15] See CTIA Petition at 4.

[16] See S. Besen, W. Burnett, An Antitrust Analysis of the Market for Mobile Telecommunications Services, Attachment to CTIA Petition for Reconsideration of the PCS Second Report and Order.

[17] See CTIA, Ex Parte Filing - Docket No. 90-314, August 2, 1994, at 1-3.

[18] See CTIA Petition at 6.

[19] See id. at 7.

[20] See Comcast Petition at 2.

percent equity interest in a licensee may lack effective control of the licensee, and cites our decision to allow cellular interests to own up to 20 percent and designated entities to own up to 40 percent of a cellular provider without being limited in PCS participation.[21] Comcast bases its request on the relaxed attribution standards for entrepreneurial companies, arguing that the same standard should apply to all PCS investors and that we should differentiate between mere ownership and exercise control of a cellular provider or PCS provider.[22] Additionally, Comcast requests that all cellular entities be permitted to bid on PCS spectrum, subject to the condition that any disqualifying cellular interests be divested within six months of the PCS license award.[23] This request is based on the assertion that allowing divestiture only to auction winners with 20 percent or less overlap is arbitrary.[24] Comcast argues that the 90 day divestiture requirement is unrealistic, given the need to locate buyers, negotiate the transaction, and obtain this Commission's approval.[25]

21. Six parties commented on cellular eligibility and ownership attribution issues.[26] Three commenters urge us to retain the current rules, and three support changes to the rules. Commenters urging us to maintain the current rules assert that no new arguments or facts have been raised to justify changing the rules, or that the arguments raised by CTIA and Comcast are insufficient to justify a rule change.[27] American Personal Communications (APC) states that current estimates indicate that it will take up to ten years to clear microwave facilities from the PCS band. This fact, according to APC, coupled with the fact that cellular companies currently have technological infrastructure and marketing in place, places new PCS licensees at an initial competitive disadvantage.[28] APC also states that our bright-line attribution standards provide ease of administration, expedite the licensing process, and save the costs of disputing ownership

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[21] See id. at 3.

[22] See id. at 4 (citing Fifth Report and Order, PP Docket No. 93-253, FCC 94-178, released July 15, 1994, *summarized* 59 FR 37566.

[23] See id. at 8-9.

[24] See id. at 8.

[25] See id. at 9.

[26] Commenters on cellular eligibility and ownership attribution were: BellSouth Corporation, BellSouth Telecommunications, Inc., BellSouth Cellular Corp. (BellSouth), McCaw Cellular Communications, Inc. (McCaw), MCI, Pacific Bell Mobile Services (PacBell), APC, and Rural Cellular Association (RCA).

[27] See MCI Comments at 1; PacBell Comments at 4.

[28] See APC Comments at 4-5.

structures and effective control.[29] APC further argues that relaxing the overlap and attribution standards could reduce the number of competitors in each market, to the detriment of consumer welfare.[30] Finally, APC asserts, our current rules limit the participation of those entities that have the greatest potential and incentive to compete less vigorously than possible, and provide for competition in each market.[31]

22. With respect to our rules on post-auction divestiture, commenters opposing a change point out that we limited post-auction divestiture to cellular entities having less than 20 percent overlap in order to guard against cellular operators with large overlap areas obstructing the licensing of new competitors by abusing the auction process. These parties argue that there would be no opportunity for competing bidders to determine whether a cellular provider's bid was sincere, or merely an attempt to increase the final price,[32] and that the possibility of such abuses would deter the entry of many potential bidders into the auction process, to the detriment of both competition and revenues.[33] Commenters also note that the 90-day divestiture requirement provides sufficient time for entities to divest their cellular holdings, especially as the 90 day period is in addition to the interval between the conclusion of auctions and the grant of the license. Commenters also contest the suggestion that it may be difficult to locate buyers, noting the existence of a ready-made market comprised of unsuccessful PCS bidders who, these commenters contend, are likely to be interested in acquiring cellular holdings.[34]

23. With respect to the PCS-cellular spectrum cap, commenters who oppose allowing cellular providers to immediately acquire 40 MHz of spectrum assert that the "head start" we are providing PCS providers is an attempt to compensate for the head start in clear spectrum, infrastructure, experience, and marketing enjoyed by cellular providers.[35] Further, these parties argue that the delay in allowing divestiture of 5 MHz blocks is based in part on the need to

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[29] See id. at 7-8.

[30] See APC Comments at 5.

[31] See PacBell Comments at 4-5.

[32] See MCI Comments at 2; PacBell Comments at 3-4; APC Comments at 10.

[33] See APC Comments at 10.

[34] See APC Comments at 11.

[35] See APC Comments at 8; PacBell Comments at 6.

conduct further rule making to determine to what extent and in what fashion partitioning of PCS spectrum blocks is to be permitted.[36]

24. Other commenters support the elimination or easing of the restrictions on cellular participation in PCS. They maintain that reconsideration of our rules is appropriate because of the adoption of auction rules[37] and the experience of the narrowband PCS nationwide auction. These parties assert that in most markets, cellular carriers will not qualify for the entrepreneur blocks because of the size of such carriers, and that this will assure at least two new PCS licensees using the entrepreneur blocks. They further assert that the fact that the winners in the narrowband PCS auction were all large companies already involved in paging, which is one type of narrowband PCS, demonstrates that companies already providing analogous services will value the spectrum most highly, and therefore will pay the most for it.[38] Accordingly, they contend that revenues to the Treasury will be maximized by the full participation of cellular incumbents, and the existence of designated entity and entrepreneurs' blocks will guarantee competition.[39] Further, these parties argue that allowing full participation will serve Congressional and Commission goals by ensuring efficient use of the spectrum, maximum recovery by the Treasury of the value of the spectrum, diversity in licensees (by including cellular incumbents) and rapid deployment of PCS.[40] These parties also contend that there is no evidence that cellular providers will behave in an anticompetitive fashion, and market analysis indicates that these companies will be unlikely to dominate the PCS market.[41] These assertions are the basis of BellSouth's argument that cellular companies should be allowed unrestricted access to PCS blocks, and McCaw Cellular Communications, Inc.'s (McCaw's) and Rural Cellular Association's (RCA's) support of CTIA's petition for setting the population overlap standard at 40 percent and the ownership attribution standard at 30-35 percent.[42] RCA further seeks to exempt rural cellular companies entirely from all limitations, arguing that rural cellular companies will provide quality mobile service and will not threaten competition because they are mere passive

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[36] See MCI Comments at 1-2.

[37] See Fifth Report and Order, PP Docket No 93-253, FCC 94-178, *summarized* 59 FR 37566 (July 22, 1994); Order on Reconsideration, PP Docket No. 93-253, FCC 94-217 (August 15, 1994).

[38] See BellSouth Comments at 6-8.

[39] See id. at 9-10.

[40] See id. at 10-17.

[41] See id. at 17-20.

[42] See id. at 5-21; RCA Comments at 1-2; McCaw Comments at 2-3.

investors in cellular providers. RCA also argues that the Congress specifically directed the Commission to ensure licensing opportunities for rural cellular companies.[43]

25. With respect to post-auction divestiture, McCaw argues that all bidders should be allowed to bid and divest only upon winning. McCaw maintains that the existing low attribution thresholds create the possibility of an affiliate of a cellular company interfering with the cellular company's ability to hold a license, without the affected cellular company's knowledge.[44] BellSouth asserts that entities with large cellular holdings will not be tempted to abuse the bidding process because they could win and be forced to pay the full price of the PCS license.[45]

26. McCaw echoes CTIA's assertion that the marketplace can best allocate the additional 5 MHz of spectrum at issue, and therefore urges us to eliminate the 35 MHz interim spectrum cap for cellular entities.[46] BellSouth asserts that the spectrum cap should be the only limit on cellular participation, and that our CMRS proceeding has established a 45 MHz cap on combined cellular, PCS, and SMR spectrum. It argues that 45 MHz should be the cap for cellular-PCS ownership because that is the cap adopted in the CMRS proceeding.[47]

27. BellSouth further advocates that we use its "multiplier" formula to determine attributable ownership. This formula multiplies spectrum in megahertz, population overlap, and percentage of ownership to arrive at its final attribution factor. BellSouth asserts that this formula produces a more accurate picture of ownership and control, and is consistent with our use of a multiplier in attributing interests to indirect owners.[48] Finally, BellSouth urges us to exempt LECs from attribution of their cellular spectrum when that spectrum is held by a separate subsidiary, claiming that it is forbidden by our rules from having any degree of control over BellSouth Cellular Corporation. BellSouth asserts that its proposal would permit LECs to provide PCS, and is fair because LECs have no control over their cellular subsidiaries.[49]

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[43] See RCA Comments at 3-5.

[44] See McCaw Comments at 3.

[45] See BellSouth Comments at 28.

[46] See McCaw Comments at 6.

[47] See BellSouth Comments at 22 (citing Third Report and Order, Gen. Docket No. 93-252, FCC 94-212, adopted August 9, 1994).

[48] See BellSouth Comments at 36-37.

[49] See BellSouth Comments at 38-39.

28. CTIA requests reconsideration of our decision to limit the option of auction participation followed by divestiture of disqualifying holdings to cellular providers whose population overlap is between 10 and 20 percent.[50] Comcast makes the same request, and further requests that we increase the time allowed for divestiture from 90 days to six months.[51] Both parties argue that there is no difference whether a cellular company holds more or less than 20 percent overlap, if it will divest itself of sufficient overlap in order to meet our requirements. CTIA specifically states that our concern that a cellular provider with more than 20 percent overlap might be tempted to interfere with the auction process is ill-founded, as such a cellular provider could find itself in the possession of a PCS license and be forced to quickly divest a large share of its cellular holdings. This argument is echoed by BellSouth and McCaw.[52]

29. Five parties replied on eligibility and attribution issues. APC and Pacific Bell Mobile Services (PacBell) urge us to maintain our current cellular eligibility and attribution standards, asserting that the entrepreneurs' blocks are insufficient by themselves to promote full competition in PCS,[53] that BellSouth's comments focus on revenues to the government without sufficient consideration of other Commission goals,[54] and that our current limits on cellular eligibility are necessary to provide opportunities for full competition in PCS.[55] In their replies, CTIA and Comcast essentially reiterate their petitions, advocating relaxation of the overlap and attribution thresholds,[56] asserting that cellular providers do not have a substantial competitive advantage over other entities in PCS,[57] and again urging a relaxation of the standards and timing of post-auction divestiture.[58] Ameritech proposes a mechanism whereby cellular providers would be allowed to divest any amount of interest to an interim independent trustee before the auction.

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[50] See CTIA Petition at 7-8.

[51] See Comcast Petition at 7-9.

[52] See CTIA Petition at 8; McCaw Comments at 3; BellSouth Comments at 27.

[53] See APC Reply at 3.

[54] See PacBell Reply at 3.

[55] See APC Reply at 4-5; PacBell Reply at 4-7.

[56] See CTIA Reply at 2-3; Comcast Reply at 2-4.

[57] See CTIA Reply at 3-8.

[58] See Comcast Reply at 5-9.

After the auction, the trustee would dispose of the interest if the cellular provider won a PCS license, or would otherwise reconvey the interest to the cellular provider.[59] Ameritech claims that this would allow participation by cellular entities in PCS auctions, while maintaining Commission control over the auction process.[60]

Discussion

30. Our rules concerning ownership attribution and population overlap standards have been thoroughly debated and considered in earlier phases of this proceeding. The arguments presented on the current record for revising those rules are in most essential respects repetitious, and we deny Comcast's and CTIA's petitions in major part on that basis. The record persuades us to modify our rules, however, to permit entities with attributable, non-controlling cellular interests to bid on in-market 30 MHz PCS licenses, on condition that they must divest prohibited cellular interests within 90 days of PCS license grant. We discuss these decisions more fully below.

31. Our principal goals for PCS include affirmatively promoting competition and preventing anticompetitive behavior.[61] The former goal flows from our explicit mandate under the Communications Act to promote competition in telecommunications and widely disseminate telecommunications licenses.[62] As such, arguments that our rules should be based wholly on the law of antitrust and corporate control are misplaced. Even if we agreed with the portrayal of antitrust law by Comcast, CTIA and their supporters (and we do not), antitrust and corporate control considerations are not the sole foundation of our rules. Rather, in accordance with our statutory mandate, those rules reflect a balance of many public interest considerations, including the need to provide parties other than existing cellular licensees an opportunity to participate in PCS. No party offers a persuasive rationale for rearranging those considerations to reflect a different balance.

32. Moreover, the petitioners' individual requests are flawed. We do not accept CTIA's unconditioned assertion that interests of 30-to-35 percent do not evidence control, which is not a uniformly supported position. For example, the Financial Accounting Standards Board ("FASB") explicitly states that an ownership interest above 20 percent presumptively demonstrates control unless evidence to the contrary is established.[63] Comcast's claim that it is

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[59] See Ameritech Reply at 1-2.

[60] See id. at 5.

[61] See Broadband PCS Reconsideration at para. 103.

[62] See 47 U.S.C. § 309.

[63] See FASB Accounting Principles Board Opinion No. 18 (1970).

unreasonable to set the PCS ownership attribution standard at 5 percent when the cellular attribution is higher ignores the reasoned basis for existing distinctions.[64] CTIA's request that we increase to 40 MHz the combined amount of attributable cellular/PCS spectrum an entity may hold immediately overlooks the fact that it is not possible, even if it were permitted, to acquire that spectrum combination given existing allocations and licensing mechanisms.[65] Arguments that raising the population overlap standard from 10 to 40 percent will not harm competition, and will actually increase competition in rural areas, are not well supported. Although CTIA submitted a study showing that smaller cellular carriers may benefit from increasing the overlap standard, the study also shows benefits flowing to very large carriers and covers fewer than 20% of total BTAs.[66] Such incomplete data and uneven results do not justify altering our rules.

33. We agree, however, that is is appropriate to modify our cellular elegibility rule (47 C.F.R. § 24.204) to create additional opportunities for entities with non-controlling, attributable in-market cellular interests to participate in PCS auctions, on condition that they divest prohibited cellular holdings within 90 days of PCS license grant. In the Broadband PCS Reconsideration, we limited the "bid but divest" option to entities with in-market cellular interests that overlap the population of a PCS service by less than 20 percent, on the theory that entities with larger overlaps may have incentives to delay the rapid introduction of PCS.[67] We are persuaded that the rule's exclusive emphasis on the degree of overlap is misplaced because the anticompetitive incentives the rule is designed to combat in the auction process are in principal part generated by the amount of the attributable cellular interest involved, and only secondarily by the degree of overlap. Indeed, our discussion of that rule at the time it was adopted explicitly recognized a link between the amount of the cellular interest involved and the

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64 As we explained in the Broadband PCS Reconsideration, the attribution standard for cellular interests other than designated entities is set at 20 percent to account for our policy in the early days of the cellular industry to encourage the formation of settlement groups -- a historic anomaly that has no counterpoint in the PCS context. Attributions levels are set higher for designated entities in accordance with our statutory mandate to promote opportunities in PCS for such entities. See Broadband PCS Reconsideration at paras. 123-132.

65 Cellular spectrum is allocated in blocks of 25 MHz, while PCS spectrum is allocated in blocks of 10 and 30 MHz, so no combination of cellular and PCS spectrum totals 40 MHz. The opportunity to achieve that total will exist when licensees are permitted to disaggregate spectrum, a process for which we have not yet adopted rules, although we are committed to addressing the legal and technical issues that must be resolved in order to adopt such rules. See Broadband PCS Reconsideration at paras. 66-71.

66 For example, CTIA's analysis states that in the 18 BTAs that comprise the Chicago MTA, increasing the overlap standard to 30% creates licensing opportunities for eleven carriers, two of whom are Sprint and Southwestern Bell. See CTIA Exparte Filing, Aug. 2, 1994.

67 Broadband PCS Reconsideration at paras. 141-146.

possibility of anticompetitive abuse.[68] We now conclude that entities holding controlling interests have greater incentives to act anticompetitively in the auction process than entities with non-controlling interests, so we will retain the existing rule as it applies to attributable controlling interests. We will supplement Section 24.204, however, to permit non-controlling interests to participate in the auction process without regard to the degree of overlap. We define a "non-controlling" license interest to be one in which the holder has less than a 50 percent voting interest and there is an unaffiliated single holder of a 50 percent or greater interest.

34. Finally, we disagree with parties that claim our rules fail to provide an adequate post-auction period for winning bidders to divest prohibited cellular interests in order to comply with our cellular/PCS cross-ownership rules.[69] We note that this period is more than just 90 days, because the period between winning the auction and issuance of license also must be considered. In addition, our rule extends well beyond the 90 days from grant of license period, discussed supra, because parties who are unable to divest within that time may satisfy the requirement by conveying a prohibited cellular interest to an independent trustee for an interim period. See 47 C.F.R. § 24.204(f)(3)(i). We take this opportunity to clarify that the trustee must divest that interest within six months from grant of license.

B. Microwave Relocation Cost Sharing

35. In 1992 we established a proceeding, ET Docket No. 92-9, for the purpose identifying spectrum for emerging technologies such as PCS. In the First Report and Order and Third Report and Order in that proceeding we established a plan for relocating incumbent licensees in emerging technology bands to other frequencies or alternative media.[70] Pursuant to that plan, PCS licensees are required to avoid interference to incumbent point-to-point microwave operations, and to fully compensate such licensees' relocation costs.

Positions of the Parties

36. PCIA requests that we mandate participation by PCS licensees in the 1850-1990 MHz band in a plan to share the costs occasioned by relocating microwave licensees in that band.[71] Absent mandatory cost sharing, PCIA argues, the spectrum-clearing efforts of early PCS market entrants will redound inequitably to the benefit of later entrants. PCIA asserts that we must

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[68] See Broadband PCS Reconsideration Order at para. 143.

[69] See, e.g., Comcast Petition at 9.

[70] See First Report and Order and Third Notice of Proposed Rulemaking, ET Docket No. 92-9, 7 FCC Rcd 6886 (1992); Third Report and Order and Memorandum Opinion and Order , ET Docket No. 92-9, 8 FCC Rcd 6589 (1993).

[71] See PCIA Petition at 5-6.

establish cost sharing obligations prior to auctions so bidders can value spectrum accurately. According to PCIA, the three basic principles of a cost sharing plan should be:

First, a cost sharing obligation should be predicated on a finding that a PCS licensee's operations would have caused interference to a microwave system's link path but for the relocation of that system.

Second, when multiple PCS licensees benefit from relocation, individual PCS licensees should be required to pay a pro-rata share only of the documented, direct costs of relocation. These would be limited to the costs of supplying a microwave licensee with comparable facilities in a different band, and would not include any premium costs an early PCS entrant might pay to accelerate a microwave licensee's relocation.

Third, a payment obligation should not arise until the time interference would be caused.

37. BellSouth, GTE, MCI, PacBell Mobile and UTAM support the principle of microwave relocation cost sharing. Although these parties offer mostly general statements of support, GTE echoes PCIA claim that establishing cost sharing obligations prior to auctions will enable bidders to value spectrum more accurately and, for this reason, the issue should be determined in this proceeding, rather than deferred to a future rulemaking.[72] In expressing its support, UTAM contends that PCIA's plan is similar to a proposal by UTAM earlier in this proceeding concerning relocation efforts in unlicensed PCS bands.[73]

38. UTC notes that while there is merit in the idea of establishing a cost sharing mechanism for microwave relocation in the 1850-1990 PCS band, the development of such a plan is beyond the scope of a petition for reconsideration in this proceeding, and is a subject more properly raised in a separate petition for rule making. UTC states that such a rulemaking could be instituted without delaying the roll-out of PCS. Moreover, UTC cautions that the development of a cost-sharing plan must not be allowed to adversely impact the market-based or individually negotiated aspects of the Commission's microwave transition plan.[74]

Discussion

39. We share UTC's reservations about the current undeveloped state of PCIA's proposal, and for that reason will deny PCIA's petition for reconsideration. We do so without prejudice to

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[72] See GTE Reply at 2-3.

[73] See UTAM Reply at 1-3.

[74] See UTC Comments at 7.

its cost sharing proposal, which PCIA and other interested parties are free to submit in a separate petition for rulemaking.

40. We take this action because while eliminating any "free rider" aspect of microwave relocation through mandatory cost sharing is an attractive idea in theory, PCIA's proposal simply is not sufficiently developed to warrant adoption at this time. Since the proposal's key terms are ambiguous, adopting it at this time likely would not assist potential bidders' efforts to value spectrum accurately. Indeed, such ambiguity may detract from those efforts. Moreover, such ambiguity increases the likelihood that this Commission will be called upon to adjudicate complex disputes that are almost wholly of a commercial nature *(e.g.*, whether a particular PCS licensee actually "benefitted" from a relocation, and to what extent; the amount of the "direct" costs of that relocation, as opposed to the "premium" costs; and the appropriate basis for measuring each PCS licensee's "pro-rata" share of such costs). We find in this record no persuasive argument for deploying our limited resources in this manner.

41. It bears emphasis that relocation costs are expected to be a relatively small portion of PCS licensees' total costs. Moreover, in the MO&O we significantly reduced microwave relocation cost burdens by revising the PCS band plan to provide for PCS operations in the comparatively less heavily loaded 1850-1990 MHz band, rather than in accordance with the band plan initially adopted in the Second Report and Order. Finally, we note that we recently made available to the public a wealth of information on microwave co-channel and adjacent channel usage in the 1850-1990 MHz band, thereby increasing the public's ability to value that spectrum accurately prior to auctions.

C. Service Areas

42. Point Communications Company (Point), the Association of Independent Designated Entities (AIDE), and Puerto Rico Telephone Company (PRTC) request modifications and/or clarifications of the service areas that we have adopted for PCS.

43. Revised Service Areas. Point requests that we use the Department of Commerce's "BEA Economic Areas" (BEAs)[75] to delineate all PCS licenses, on the ground that designated entities licensed to serve BTAs cannot compete with large companies licensed to serve MTAs. According to Point, BEAs provide equal service areas, and are small enough to create meaningful opportunities for designated entities, while large enough to attract major spectrum bidders. Alternatively, if BEAs are not employed, then Point requests that the Commission subdivide

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[75] In its comments to the Notice of Proposed Rule Making and Tentative Decision in this proceeding, the National Telecommunications and Information Administration (NTIA) proposed that PCS be licensed using the 183 "economic areas" defined by the Department of Commerce's Bureau of Economic Analysis (BEA). NTIA stated that each of these economic areas generally consists of a Metropolitan Statistical Area (MSA) or a similar area that serves as a center of economic activity and surrounding counties that are economically related to the center.

some MTAs, particularly those on the West Coast.[76] Finally, Point requests that we vary the spectrum blocks designated for entrepreneurs from market to market. Point contends that if designated entities were to have larger corporations on their frequency blocks in other markets, the companies would ensure that the smaller ones do not lag in technological or service development.[77]

44. In the PCS Second Report and Order, we based the service areas for broadband PCS on MTAs and BTAs. We concluded that a combination of MTA and BTA service areas would promote the rapid deployment and ubiquitous coverage of PCS and a variety of services and providers. We also stated our belief that a combination of MTA and BTA service areas would maximize the benefits of having both large and small service areas. [78]

45. In the Broadband PCS Reconsideration, we further addressed the possibility of using BEAs as the PCS service areas. We acknowledged that identical geographic areas could impose more initial competitive parity, but stated that such a plan was likely to foreclose cellular providers and prove too large for many designated entities to finance. Congress has mandated that we provide areas that promote opportunity for a wide variety of applicants,[79] and we determined that the two tier system provided by the use of MTAs and BTAs best met this mandate.[80]

46. MCI Telecommunications Corporation (MCI) and PacBell address Point's petition. Both simply assert that Point's proposed BEA plan was proposed by NTIA in the prior reconsideration, discussed in the Broadband PCS Reconsideration and there rejected. Both commenters state that this issue has been dealt with adequately.[81] MCI adds that any reconsideration of service areas would inevitably delay the auction and licensing and inauguration of PCS.[82] No replies addressed this issue.

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[76] See Point Petition at 1-4.

[77] See id. at 5.

[78] PCS Second Report and Order, 8 FCC Rcd at 7729-34 (paras. 64-78).

[79] See 47 U.S.C. § 309(j)(4)(C).

[80] See Broadband PCS Reconsideration at paras. 77-78.

[81] See MCI Comments at 4; PacBell Comments at 2-3.

[82] See MCI Comments at 4.

47. We have previously addressed Point's contentions respecting BEA-defined service areas in the PCS Second Report and Order and PCS Broadband Reconsideration, and Point has here offered no new information or argument to justify a change in our decision. Nor can we accept Point's assertion that varying the entrepreneurs' blocks from market to market will create blocks where entrepreneurs will occupy the same frequencies as larger companies in other markets, which will promote cooperation and assistance to the entrepreneurs from the large companies.[83] We specifically changed the frequency allocation to PCS to minimize the difficulty of switching frequencies within or between blocks. [84] Given the level of equipment technology available, we do not expect that sharing frequency blocks will provide any incentive to form the frequency block communities envisioned by Point. Rather, we believe that if a licensee had different blocks in different service areas, it would generally tend to switch frequencies rather than establish a relationship with counterpart licensee(s) using the same frequencies elsewhere. For this reason, we do not believe that varying the spectrum for the entrepreneurs' block from market to market will have a salutary effect, and we decline to make such a change.

48. Permitted Use of MTAs/BTAs. AIDE requests that the Commission expand the rationale upon which we based PCS service areas on Rand McNally MTA/BTA definitions. AIDE suggests that we explicitly include Rand McNally's written clarification, as set forth in correspondence with AIDE's attorney, that a licensing agreement between Rand McNally and PCIA was intended to grant broad rights to potential users and repackagers of Rand McNally's MTAs and BTAs. No party addressed AIDE's request for clarification.

49. On February 10, 1994, PCIA and Rand McNally entered into a License Agreement.[85] Under this agreement, Rand McNally grants PCIA and all other interested parties "a nonexclusive license to reproduce, create derivative works from, publicly distribute and publicly display" the listing of counties that comprise Rand McNally's 487 BTAs and 47 MTAs, the BTA/MTA Map contained on pages 38-39 of the 1992 version of Rand McNally's Commercial Atlas & Marketing Guide, and derivative works created therefrom for the purpose of preparing documents in connection with PCS and other services, provided that the appropriate copyright legend is displayed.

50. On February 25, 1994, AIDE requested clarification from Rand McNally concerning the scope of the Licensing Agreement. [86] On March 10, 1994, Rand McNally stated that the License

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[83] See Point Petition at 5.

[84] See Broadband PCS Reconsideration at paras. 33, 35.

[85] See AIDE Petition at Attachment B.

[86] See letter to Ms. Deborah Lipoff, Rand McNally, from William J. Franklin, AIDE Petition Attachment C.

"Agreement was intended to grant broad rights to potential users and repackagers", regardless of whether "the use was carried out on a cost-recovery basis or profit-making basis". [87]

51. We have reviewed the Licensing Agreement between PCIA and Rand McNally and the Clarification of the Agreement between AIDE and Rand McNally. It is not our practice in rulemaking proceedings to clarify the meaning of private commercial contracts and related correspondence, and we have not been provided any persuasive reason to depart from that practice here. Our reasons for using the MTA/BTA system, the licensing agreement between Rand McNally and PCIA, and the related correspondence filed with AIDE's petition are matters of public record. We will let that record speak for itself, absent a demonstration that clarification is needed to further the public interest.

52. Local Service Areas in Puerto Rico. PRTC requests that the Commission reinstate the previously adopted unitary Puerto Rico BTA, arguing that Puerto Rico is in reality a single market. PRTC claims that the original BTA was appropriately tailored to the natural flow of commerce, arguing that the mountain range does not cause difficulties in travel nor separate the island into two areas. PRTC also states that the island is geographically one of the smaller BTAs. [88] Finally, PRTC states that a single BTA would facilitate the provision of lower cost service to all of Puerto Rico, arguing that the costs to consumers of constructing and operating a PCS network would be lower if the costs are shared by end users across the island than if consumers in the new, smaller BTAs must support an independent system serving the more thinly populated sectors of the island.[89]

53. In the PCS Second Report and Order, we established Puerto Rico as a single, BTA-like service area. In a petition for reconsideration of that decision, Pegasus Communications, Inc. (Pegasus), requested that we divide the Puerto Rico service area into two local service areas. Pegasus argued that due to the size and mountainous terrain of the island, Puerto Rico essentially is split in half, comprising two commercial centers: San Juan and Mayagüez-Ponce. Pegasus stated that these mountains make travel to San Juan difficult for Puerto Ricans located in the southern and western portions of the island, and therefore they must conduct essentially all commerce in the port cities of Mayagüez, Aguadilla, or Ponce. Pegasus also stated that the population of its proposed Mayagüez/Aguadilla-Ponce service area is more than one million and this area would be larger in population than several of the existing BTAs. Pegasus provided a list of municipios that it suggests constitute the Mayagüez/Aguadilla-Ponce service area, and suggested that the San Juan service area consist of all municipios not listed for the

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[87] See letter from Deborah Lipoff, Rand McNally, to William J. Franklin, AIDE Petition Attachment D.

[88] PRTC Petition at 3-9.

[89] Id. at 9-11.

Mayagüez/Aguadilla-Ponce BTA-like service area.[90] No party responded to this petition. Accordingly, we adopted Pegasus' suggestion and established two separate service areas in Puerto Rico, one for Mayagüez/Aguadilla-Ponce and one for San Juan. We stated that this change recognizes the difficulties created by the mountain range separating these two areas and that we found this adjustment to be in the public interest. [91]

54. In response to PRTC's petition, Pegasus states initially that PRTC had ample opportunity to address the division of Puerto Rico into two BTAs in the previous reconsideration of the broadband PCS rules, and in failing to do so, lost the right to petition here for a reversal of that decision.[92] Pegasus also asserts that PRTC presents no facts that justify its request to consolidate Puerto Rico into a single BTA,[93] and presents a number of geographical and economic factors which support the division of Puerto Rico into two BTAs.[94] PRTC replies that its petition is timely and proper at this stage of the proceeding, and would benefit the public interest.[95] PRTC also reiterates the facts presented in its petition, and asserts that they support the need for Puerto Rico to be a single BTA.[96] In a late-filed response, Pegasus seeks to rebut several of PRTC's factual assertions. [97]

55. We continue to believe that the division of Puerto Rico into two BTA-like service areas is appropriate for this service. We note that the 1990 census for Puerto Rico is 3,522,037.[98] The

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[90] The primary political divisions of Puerto Rico are termed "municipios." See 1990 Census of Population and Housing [,] Summary Population and Housing Characteristics [for] Puerto Rico, 1990 CPH-1-53, Issued November 1991 by the Bureau of the Census, at page A-5. In its petition, Pegasus translates "municipios" to be "counties." We use the term "municipios" to avoid confusion.

[91] Broadband PCS Reconsideration at para. 79.

[92] See Pegasus Comments at 2-3.

[93] See id. at 4-5.

[94] See id. at 6-10.

[95] See PRTC Reply at 3-6.

[96] See id. at 6-9.

[97] See Pegasus Response to Reply of PRTC. This response was late filed, and could have been dismissed for that reason, despite Pegasus' assertion that it reserved the right to rebut factual assertions by PRTC. For the sake of completeness of the record, however, we consider this response.

[98] See id. at 1.

population of the new Mayagüez/Aguadilla-Ponce service area is 1,048,473 and the population of the new San Juan service area is 2,473,564. Only 49 of the 493 BTAs have a population greater than 1,048,473 and only 18 BTAs have a population greater than 2,473,564.[99] We find that the population of each of these service areas is sufficient to support broadband PCS services.[100] Additionally, we conclude that the patterns of local trade make the proposed division economically and geographically desirable. If PRTC is correct, and Puerto Rico is better served by a single, island wide BTA, this can be effected by networking the two BTAs into what amounts to a single structure. The two BTA plan allows for this, while at the same time allowing the two BTAs to be served separately if that is the best method. Hence, the current plan offers more choices, and allows the marketplace to decide which is the better choice. Nor do PRTC's arguments persuade us to reinstate a unitary local service area for Puerto Rico.[101] Accordingly, we will maintain two BTA-like service areas in Puerto Rico for broadband PCS services.

D. Technical Issues

56. Licensed Service, Power Limits. In the Broadband PCS Reconsideration, we increased the maximum base station transmission limit from 100 to 1640 watts equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters height above average terrain (HAAT).[102] We adopted this amendment in order to improve PCS licensees' ability to configure their systems to best serve the needs of their customers and to compete with other mobile services such as cellular and wide-area SMR. Spatial Communications, Inc. and ArrayComm, Inc. (SCI/ArrayComm) make two, related requests. First, they ask that the rules governing limitations on transmitted power be redefined in units of power per unit bandwidth, rather than expressed as limits on individual transmitters (regardless of bandwidth). [103] SCI/ArrayComm

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[99] See Rand McNally 1992 Commercial Atlas & Marketing Guide, "Population, Income and Sales Data for the 150 Largest Basic Trading Areas," at page 44, Census 4/1/90 column.

[100] We note that Puerto Rico is licensed as five MSAs and seven Rural Service Areas (RSAs) in the Domestic Public Cellular Radio Telecommunications Service.

[101] PRTC provides cellular telephone throughout Puerto Rico. Thus PRTC, like all in-market cellular operators, is initially limited to one 10 MHz BTA license in any geographic area of Puerto Rico. We note however that, under the current rules, PRTC can purchase a 10 MHz license in both BTAs and thus serve the entire island. We do not believe that the adopted licensing scheme greatly affects PRTC. However, we believe that a single BTA potentially could preclude many individuals and companies from competing against PRTC.

[102] Broadband PCS Reconsideration at paras. 172-174. Base station antennas may exceed 300 meters with a corresponding reduction in power. Mobile/portable stations are limited to 2 watts EIRP and must limit power to the minimum necessary for successful communications. See § 24.232 of the Commission's Rules.

[103] SCI/ArrayComm are developers of Spatial Division Multiple Access (SDMA) technology, which uses patented algorithms to

argues that the current rules define transmitter power limits in a manner that favors the use of narrowband over wideband transmissions.

57. Second, however power limits are defined, SCI/ArrayComm states that by maintaining a power limit of 100 watts per transmitter the Commission may have inadvertently discouraged the use of smart antenna technology. SCI/ArrayComm asserts that applying low transmitter power limits to use of highly directional antenna technology will preclude larger and more economic cell sizes by restricting the effective range of "broadcast" control channels that determine the ultimate size of the coverage area.[104] SCI/ArrayComm requests the transmitter power limit of 100 watts apply to individual base station transmitters without regard to the number of such transmitters employed at each base station, the antenna element or elements to which each transmitter is connected, or the channels in which each transmitter is allowed to transmit. SCI/ArrayComm argues that this clarification is needed to ensure that the power limits do not unfairly disadvantage new technologies, such as smart antennas.[105]

58. Five comments address SCI/ArrayComm's request for clarification.[106] MCI, Motorola and Northern Telecom support the petition in part.[107] As to the definition of power limits, MCI recommends that the Commission, while maintaining the overall base station power limit of 1640 watts EIRP, give careful consideration to the proposed bandwidth-based method of defining power suggested by SCI/ArrayComm. MCI states that the Commission may wish to authorize the use of the SCI/ArrayComm formula as an alternative method, at the carrier's option. Motorola states that it is still analyzing the ramifications of adopting a "watts per hertz" standard. Northern Telecom states that it is concerned that, while the SCI/ArrayComm proposal to redefine the power limits does lead to an acceptable power level, the formulation of the new limits is unduly complicated and likely to lead to confusion. Sprint states that SCI/ArrayComm's complaint that expressing power limits in watts per channel favors narrowband channelization is inconsistent with its previous statement that its technology is compatible with all modulations.[108]

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implement "smart antennas" that assign specific antenna elements to track mobile users and selectively direct RF energy to them.

[104] SCI/ArrayComm Petition at 6.

[105] For clarity, SCI/ArrayComm adds that it should be acceptable for more than one base station transmitter to transmit 100 watts of power in the same RF channel at the same time as long as different antenna elements are used for each transmitter, i.e., power level as measured at the input to an antenna element. SCI/Arraycomm Petition at 6-7.

[106] Comments on this issue were filed by MCI, Motorola, Northern Telecom, APC and Sprint Corporation (Sprint).

[107] See Motorola Comments at 11; MCI Comments at 5; Northern Telecom Comments at 6-7.

[108] See Sprint Comments at 2-3.

59. As to the "per transmitter" provision, Motorola states that it believes the current rules can be reasonably interpreted as indicating that the adopted power limits apply to individual base station transmitters without regard to the number of co-channel transmitters employed at each base station, but does not object to clarification of the rule. Northern Telecom supports clarification that the power limits apply to individual transmitters. APC asserts that our rules are clear on power limits and require no clarification.[109]

60. With respect to the redefinition issue, SCI/ArrayComm replies that, contrary to Sprint's statement, SCI/ArrayComm's concern is not about competitive advantages, but is intended to maximize flexibility in PCS system design.[110] Motorola indicates that, upon further analysis, it is convinced that the existing rule of 100 watts maximum transmitter power with a limit of 1640 watts maximum EIRP is adequate to provide design flexibility and excellent system performance.[111] Motorola supports the connection of multiple transmitters to an antenna array, provided the total EIRP does not exceed 1640 watts as averaged over a defined time interval so as not to exceed established interference criteria.[112] In response to SCI/ArrayComm's statement that the existing rules favor narrowband technologies, Motorola notes that many factors determine overall system design and performance capability and that this issue alone will not affect the introduction and use of wideband PCS technologies. It cites the number of wideband systems currently under development as evidence that the rules are flexible and technology-neutral. No reply comments address the "per transmitter" clarification.

61. Discussion. As an initial matter, we decline SCI/ArrayComm's request to redefine transmitter limits in power per hertz or power per unit bandwidth. While SCI/ArrayComm states that the current power per channel specification favors narrowband over wideband systems, the existing approach simply leaves to the licensee the determination how to balance the multiple design considerations in its system, from transmitter power and configuration to the gain achieved by receivers, without placing any overall limit on system power so long as its individual transmitters and field strength data comply with our rules. As Motorola observes, system design partakes of many considerations other than the power tradeoffs inherent in narrowband and wideband systems. [113] We find that our current definition of power limitations does not constrain

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[109] See APC Comments at 5.

[110] See SCI/ArrayComm Reply at 2-5.

[111] See Motorola Reply at 4.

[112] Motorola does not provide technical details as to how this averaging should occur or the time interval that should be employed.

[113] For example, the material contained in the SCI/ArrayComm *ex parte* filing suggests that changing the regulations to specify power limits in terms of watts per hertz could significantly increase the transmission range of a PCS base station. This could

licensees considering such choices; nor does it significantly favor one technology over another. Moreover, SCI/ArrayComm has not explained its contention that the rules discourage highly directional antenna technology in its petition or comments. For these reasons, we deny SCI/ArrayComm's request to redefine the transmitter power limits. [114]

62. As regards power levels per transmitter, antenna or antenna element, it was always our intent that the 100 watts per channel and 1640 watts EIRP requirements apply to these individual components and not to the sum of all components at the entire base station, provided the maximum EIRP radiated by the base station in any given direction on any given channel does not exceed 1640 watts. This interpretation is consistent with our application of similar rules in the cellular service. We believe that this statement is of itself sufficient interpretation of this provision of the rules, and no amendment to the rules is needed.

63. Licensed Service, Out-of-band Emission Levels. Omnipoint Corporation (Omnipoint) requests that an emission mask, similar to the one specified for isochronous unlicensed PCS devices, be adopted for licensed PCS out-of-band emissions using a resolution bandwidth on the measurement instrument approximately equal to one percent of the emission bandwidth of the device under test.[115] Omnipoint states that the Commission should specify out-of-band emissions separately from spurious emissions, arguing that out-of-band emissions are dependent on the PCS system's modulation techniques and modulation rates. Omnipoint also states that the Commission's ability to measure and monitor out-of-band emissions would be greatly simplified by the use of a modulation mask. Omnipoint states that a modulation mask, which permits constant envelope digital modulations to operate in the band, would ensure that low cost equipment could be deployed in both the licensed and unlicensed bands. Finally, Omnipoint suggests that the current rule for emission limits[116] applies only to spurious emissions.[117]

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have the further effect of increasing the potential for interference to existing microwave users, or possibly reducing interference compared to covering the same area with multiple, smaller sized cells employing omnidirectional systems. The implications of the proposed redefinition for coordination requirements of PCS licensees, including the potential for delays in providing service to the public, are not sufficiently developed on this record to support such a fundamental change as SCI/ArrayComm proposes.

[114] We stress that our denial is without prejudice to a subsequent petition for rule making, should SCI/ArrayComm or other parties wish to pursue these issues on a more fully developed record.

[115] Omnipoint Petition at p. 6-8 and Figures 1,2. An out-of-band emission is an emission on a frequency or frequencies immediately outside the necessary bandwidth which results from the modulation process, excluding spurious emissions. See 47 C.F.R. § 2.1. See also § 15.323(d) of the Commission's Rules for the isochronous devices' modulation mask.

[116] See § 24.238 of the Commission's Rules.

[117] A spurious emission is an emission on a frequency or frequencies which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include

64. Celeritek Incorporated (Celeritek) strongly supports adoption of an out-of-band emission mask that allows the use of constant envelope modulation formats. MCI, however, opposes these limits stating that Omnipoint's proposed rule contains a series of definitions that have the effect of allowing Omnipoint, or another operator using a similar wideband signal, to cause harmful interference to the users of adjacent frequency blocks. Accordingly, MCI recommends that the Commission not adopt these limits prior to a thorough industry review, such as through a Joint Technical Committee. MCI agrees that the Commission might authorize Omnipoint to use these limits on a waiver basis, subject to the submission of evidence that it has obtained the prior written consent of all potentially affected parties, including those operating, or requesting authorization to operate, in adjacent frequency bands. Motorola notes that the Errata to the MO&O [118] provides additional clarification and flexibility and may already accommodate Omnipoint's concerns by allowing use of alternative resolution bandwidths for measuring out-of-band emissions. Motorola adds that the clarification requested by Omnipoint may eliminate any uncertainties with respect to the proper measurement standards and that this matter is being addressed in ANSI/IEEE C63-SC7 and the WINTest group of WINForum.

65. Reply comments on this portion of the Omnipoint petition were filed by AT&T Corp. (AT&T), Motorola, and Omnipoint.[119] Omnipoint states that it has modified its proposals for the measurement of out-of-band and spurious emissions in order to directly address MCI's concerns with adjacent channel interference.[120] It argues that industry can not wait to have this rule clarified at some later date since no PCS technology can pass the existing rule within the 5 MHz bands associated with the 10 MHz licenses. Omnipoint adds that its proposal attempts to enable all PCS technologies by including a realistic spectrum emissions mask and a realistic resolution bandwidth measurement.[121] AT&T agrees with Omnipoint's position, and Motorola's

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harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products, but exclude out-of-band emissions. Necessary bandwidth is, for a given class of emission, the width of the frequency band which is just sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions. See 47 C.F.R. § 2.1.

[118] See n.1, *supra*.

[119] See Replies of AT&T at 6, Motorola at 4-5, and Omnipoint at 1-5.

[120] In its petition for reconsideration, Omnipoint proposed use of the unlicensed PCS isochronous out-of-band emission mask, which calls for 30 DB suppression for signals up to 1.25 MHz from the band edge, 50 dB suppression between 1.25 MHz and 2.5 MHz from the band edge, and 60 dB suppression beyond. In responding to MCI's concerns, Omnipoint proposed a linear roll-off between 30 dB at the band edge and 50 dB at 1.25 MHz beyond the band edge, and between 50 dB at 1.25 MHz and 60 dB at 2.50 MHz from the band edge.

[121] The changes recommended by Omnipoint to the regulations on emission limits retain the existing standards as applied to spurious emissions. See Omnipoint Reply at 4-5. Omnipoint further described its proposed changes in its *ex parte* presentation

comments in support of that position, regarding the procedures for measuring out-of-band emissions and supports the efforts of WINForum and ANSI/IEEE C63-SC7 in addressing this matter. Motorola, while supporting the intent of the Omnipoint proposal in its comments, now expresses concern that it is premature to adopt specific testing language in the rules. Instead, Motorola supports continued consultation with industry groups such as TIA, T1, ANSI/IEEE C63-SC7, and the WINTest group of WINForum before specific testing requirements are detailed. Motorola and Omnipoint subsequently made ex parte presentations proposing specific measurement methods for out-of-band emissions.[122] Omnipoint asserts that the current limits are effectively more severe than the levels permitted for out-of-band emissions for unlicensed PCS devices.

66. Discussion In adopting standards for wideband licensed PCS systems, the Commission declined to specify a modulation or channelization scheme within a licensee's frequency block. Further, the Commission attempted to adopt technical standards that did not intentionally favor one technology over another. We continue to believe that this flexible approach encourages and facilitates the broadest range of PCS services and devices by permitting licensees to determine the most economic and effective methods of using the spectrum. We also indicated that most parties recognize that PCS is at a nascent stage in its development and that imposition of a rigid technical framework at this time could stifle the introduction of important new technology.[123] Our concern regarding technical standards was to ensure that PCS licensees did not cause harmful interference to existing microwave facilities or to each other.

67. The Commission specified that all emissions appearing outside of the licensee's frequency block must be attenuated by 43 + 10 log (P) dB below the transmitter power.[124] This requirement must be met by licensees and is not specifically aimed at the design of radio equipment. We did so because we sought to provide maximum flexibility to both licensees and equipment manufacturers as to how they might control emissions outside the licensee's frequency

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to the Commission on September 30, 1994.

[122] See letters dated September 30, 1994, from Mr. David E. Hilliard of Wiley, Rein & Fielding to Mr. Julius Knapp, Chief, Authorization and Evaluation Division, OET, and to Mr. William F. Caton, Acting Secretary, FCC. In these letters, Motorola proposes that out-of-band emissions be measured using a resolution bandwidth of approximately one percent of the emission bandwidth of the device under test and integrating the energy over a measurement bandwidth of 1 MHz. Motorola also requests that, during emission measurements, the center of the PCS transmission be displaced from the edge of the channel block by an amount equal to its occupied bandwidth. Omnipoint submitted an ex parte filing, dated October 4, 1994, from Mr. Mark J. O'Connor of Piper & Marbury to Mr. William F. Caton, responding to Motorola's proposals. Omnipoint objects to the complexity of the Motorola procedure.

[123] See PCS Second Report and Order, 8 FCC Rcd at 7755-56 (paras. 135-137).

[124] See 47 CFR Section 24.238; see also Broadband PCS Reconsideration at paras. 194-201.

block. For example, a licensee could choose to use equipment that is not designed to meet a stringent out-of-band emissions mask, yet still ensure compliance with our emissions limits by leaving a guard band near the edge of the frequency block..[125] With regard to Omnipoint's assertion that equipment will be made unnecessarily costly by the current requirement, we observe that this is not necessarily the case. The equipment can be designed so that it does not operate right up to the edge of a frequency block. We believe that any reduction in capacity of the spectrum by avoiding close proximity to the band edges will be negligible. With regard to Omnipoint's assertion that the unlicensed PCS rules are not as stringent with regard to spurious emissions, and the implicit suggestion that emissions standards for out-of-band emissions by licensed services should be correspondingly eased, we note that standards for unlicensed PCS are only 3.5 dB less stringent within 1.25 MHz of the band edge, an insignificant difference. We find that our basic standard of 43 + 10 log(P) dB is necessary and appropriate to control interference between licensees.[126] Accordingly, we are retaining the current emissions standard. To this extent, Omnipoint's petition is denied.

68. We are persuaded that further clarification is needed with regard to the measurement of emissions immediately outside the necessary bandwidth of the transmitted signal. The current rule states that measurement instrumentation employing a 1 MHz resolution bandwidth shall be employed; however, where emissions within the licensee's frequency block influence the levels of the signals measured outside this block in such a manner to make it appear that these emissions are not in compliance with the standards, alternative measurement techniques may be employed. The commenting parties generally agree that the use of a resolution bandwidth of approximately one percent of the bandwidth of the device under test is appropriate for measuring emissions immediately outside of the frequency block. We are specifically noting this as an appropriate test procedure in the rules. To this extent, Omnipoint's petition is granted. We believe that this action should satisfactorily resolve much of Omnipoint's and the commenters' concerns. The Commission's staff may provide further guidance on this and other measurement matters that may arise, consistent with our current practice.

69. Unlicensed Devices. Omnipoint requests that the unlicensed isochronous[127] frame period[128] be changed from 10 milliseconds/X to 20 milliseconds/X where X is a whole

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[125] Equipment manufacturers would need to locate fundamental emissions, based on whatever method of channelization is employed, a sufficient distance within a licensee's frequency block to ensure that only spurious emissions, meeting this limit, appear outside of the frequency block.

[126] We note that several industry technical and standards groups are addressing matters relating to technical standards for PCS both domestically and internationally. At such time as these groups agree upon standards, we may consider appropriate limits on out-of-band emissions also could be considered.

[127] Isochronous devices transmit at a regular interval, typified by time-division voice systems.

[128] Frame period is a set of consecutive time slots in which the position of each time slot

number.[129] They argue that this will allow for use of advanced vocoders and promote interoperability between licensed and unlicensed PCS systems that are expected to use advanced vocoder technology. Omnipoint states that the latest generation of vocoders require a 20 millisecond frame period in order to significantly improve throughput and slot time efficiency. Omnipoint states more specifically that in these respects, its 8 kbps codebook excited linear predictive (CELP) type of vocoder meets or exceeds the performance of 32 kbps adaptive pulse code modulation (ADPCM) types that have commonly been promoted for unlicensed equipment. Omnipoint claims their vocoder technology provides a 4:1 improvement over the 32 kbps vocoder ADPCM technology in throughput efficiency.

70. Comments. Motorola opposes Omnipoint's request to change the frame period from 10 milliseconds/X to 20 milliseconds/X and argues that this change would disadvantage narrow band technologies.[130] Motorola contends this disadvantage arises from the relationship between the current "listen before talk" monitoring period of 10 milliseconds and the current frame period definition of 10 milliseconds/X that were chosen to accommodate different technologies and promote spectrum efficiency. Increasing the frame period to 20 milliseconds/X and the monitoring period to 20 milliseconds would double the time required to monitor each frequency/time window. Motorola asserts that performance would be degraded significantly when systems must search a large number of channels. Battery life of portable units would also be reduced. Motorola also asserts that the current frame period will support vocoders that utilize analysis intervals longer than 10 milliseconds. Motorola provides an example of current technology (GSM) that utilizes a vocoder analysis interval longer than its frame period interval.

71. Replies. Omnipoint replies that extending the frame period and monitoring period from 10 to 20 milliseconds would result in an additional delay of only one hundredth of a second when accessing a time and spectrum window.[131] They also disagree that extending the frame period and monitoring period will greatly and adversely affect the time required to find an open

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can be identified by reference to a synchronizing source. Currently, our rules provide that the frame period of an intentional radiator operating in the 1920-1930 MHz sub-band will be 10 ms/X where X is a positive whole number. See § 15.323(e) of the Commission's Rules.

[129] See Omnipoint Petition at 3-6.

[130] See Comments of Motorola at 13-15. In an *ex parte* filing dated September 30, 1994, Motorola suggested that we clarify the rules regarding the random interval waiting period as it applies to isochronous transmissions. Specifically, Motorola requests that we clarify that any interruption in transmission require application of the uniform random distribution waiting interval before the same time and spectrum window may be reaccessed. We believe this issue can be handled as an interpretation of the rules and no change is necessary in the wording of the requirements.

[131] See Reply of Omnipoint at p. 5-8 and Figure 1.

frequency slot or reduce battery life. AT&T opposes extending the frame period and monitoring period to 20 milliseconds and supports Motorola's arguments.[132] AT&T, however, presents a compromise approach that it believes addresses the concerns of all parties. AT&T proposes that we delete the requirement for systems with 40 or more defined channels to monitor all channels at an access level of 30 dB above thermal noise power. This would relieve large systems of the requirement that they perform repetitive listen before talk monitoring to determine if a clear channel is available, thereby negating the increased access time and battery life issues for larger systems.

72. Extending the maximum frame period of isochronous devices from 10 to 20 milliseconds was addressed in the Broadband PCS Reconsideration.[133] Proponents argued at that time that this change would permit the widest range of present and future technologies to operate in the unlicensed band in the most equitable manner, and so would improve the potential for equipment capable of operating in both the licensed and unlicensed spectrum. Opponents argued that lengthening the frame period would necessitate longer channel setup and access times and decrease battery life in portable units. In making our decision to retain 10 milliseconds as the maximum frame period, we stated that a longer frame period could potentially reduce spectrum efficiency and that we were unconvinced that an increase in the frame period would improve the likelihood of compatibility with future technical standards for licensed PCS equipment.

73. Discussion. Throughout this proceeding the Commission has continued to support the concept that regulatory impact on present and future potential technologies should be minimized wherever possible in order to provide maximum flexibility for technological innovation. This is especially true when minor adjustments in technical requirements would permit additional technological innovation or alternatives without compromising other implementations. From this perspective, the compromise proposed by AT&T is flawed because it could potentially lead to greatly increased interference between systems competing for limited spectrum. However, analysis by Commission staff of isochronous device operation under the current unlicensed technical requirements has developed a compromise regarding the frame period that will provide for additional technical innovation in the unlicensed spectrum, while not affecting the operation of systems with a 10 millisecond or shorter frame period.

74. This additional flexibility can be achieved by modifying the appropriate rules to permit devices with frame periods of 20 milliseconds to access unlicensed spectrum, and also requiring systems with a 20 millisecond frame period to extend the listen before talk monitoring time to 20 milliseconds. There is little, if any, foreseeable adverse impact on systems that use a 10 millisecond or shorter frame period from systems using a 20 millisecond frame period. By continuing to permit systems with a 10 millisecond or shorter frame period to utilize a monitoring period of 10 milliseconds, they will be unaffected by this rule change. This addresses

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[132] See Reply of AT&T at p. 1-6.

[133] See Broadband PCS Reconsideration at para. 238.

the concerns raised about channel access times and battery life by continuing to permit system operation consistent with the current rule requirements. Systems with a frame period of 20 milliseconds may be somewhat disadvantaged relative to systems with a shorter frame period because they will have longer channel set-up and access times. The changes in the rules, however, will afford relief to technologies that, because of choice or design constraints, use a frame period of 20 milliseconds and permits those technologies access to the unlicensed spectrum. We are, therefore, revising Sections 15.323(c)(1), 15.323(c)(5) and 15.323(e), that prescribe the channel access requirements, to accommodate systems that use a frame period of up to 20 milliseconds.

E. PCS Interference to the Broadcast Auxiliary Service.

75. The Joint Broadcast Parties request that we clarify that we will, inter alia, address the potential for interference to the Broadcast Auxiliary Service in the 1990-2110 MHz band by high power PCS base stations in the subjacent 1970-1990 MHz band.[134] Specifically, the Joint Broadcast Parties request that we establish a guard band in the 1970-1990 MHz range, within which only low power mobile units would be allowed to operate.[135] In the alternative, the Joint Broadcast Parties request that we establish a minimum separation distance of two kilometers between PCS base stations and broadcast auxiliary receive sites.[136]

76. Comments. Five commenters addressed the Joint Broadcast Parties' petition. Commenters argue that the Joint Broadcast Parties' analysis of the likelihood of interference is premised upon worst case conditions, especially in assuming that a PCS base station will be directly between the broadcast auxiliary transmitter and receiver, that the PCS station will necessarily be operating at the maximum allowable power, and that a distance of up to two kilometers represents immediate proximity.[137] Further, they state that the suggested guard band would have the effect of imposing use restrictions on PCS Blocks C and F that would decrease the value of those blocks, and necessitate design of PCS handsets more complex and expensive than are necessary under the current plan. Commenters also claim that the proposed restrictions work against general design principles, which indicate that the lower power transmitter should operate on the lower frequency. Commenters also argue that the proposed guard band would create "technological islands" that would interfere with the interoperability of PCS, to the

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[134] See Joint Broadcast Parties Petition at 5.

[135] See id., Attachment at 1.

[136] The remainder of the Joint Broadcast Parties' petition addresses issues of spectrum allocation and service relocation that do not bear on this proceeding. See id., Attachment at 1.

[137] See APC Comments, Exhibit 2 at 2-3; Motorola Comments at 5-7; Northern Telecom Comments at 5-6.

especial detriment of designated entities and entrepreneurial licensees.[138] Finally, our current rules on interference and out-of-band emissions are sufficient to protect broadcast auxiliary operations, according to commenters.[139]

77. Replies. The Joint Broadcast Parties state that those opposing its initial petition for stricter interference protections make no serious effort to quantify the actual risk of interference, and reassert that the BAS needs more protection from potential interference by PCS.[140] Motorola Inc. (Motorola) reiterates its opposition to the establishment of a guard band.[141]

78. Discussion. MSTV's concerns arise from two actions in the PCS Broadband Reconsideration: the increased maximum permissible power approved for PCS base stations, and the allocation to PCS of a portion of spectrum that is internationally designated for MSS. The increased power limit, MSTV asserts, carries with it an increased potential for interference to BAS users in the adjacent band, while the revised allocation plan renews BAS users' concern that their operations on the 1990-2110 MHz band not be compromised by subsequent MSS allocation decisions.

79. As to the potential for increased interference to BAS users, including ENG applications, the record does not persuade us that protective action beyond the measures adopted in the PCS Broadband Reconsideration is necessary. There, we amended our rules to indicate that spurious emission limits apply to all frequencies outside the block employed by a PCS licensee, and clarified compliance testing procedures.[142] We also amended our rules to specify the resolution bandwidth of measuring instruments. These rules apply both to the transmitter and the operating system, as installed by the licensee, and the Commission retains the authority to require additional attenuation when emissions cause harmful interference to other users of the RF spectrum. [143]

80. To support its argument for measures more extensive than these existing provisions, MSTV submits an engineering exhibit premised on worst case assumptions, which provides a wholly insufficient basis from which to conclude that present interference protection measures

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[138] See APC Comments, Exhibit 2 at 1-2; Northern Telecom Comments at 4-5; PCIA Opposition at 2.

[139] See Comsat Comments at 3; Motorola Comments at 7-8; Northern Telecom Comments at 6.

[140] See Joint Broadcast Parties Reply at 3-5.

[141] See Motorola Reply at 1-3.

[142] PCS Broadband Reconsideration at paras. 197-199.

[143] See id. at para. 200; Appendix A at Sec. 24.238(b).

are so inadequate as to require substantial additional safeguards. We are not persuaded that the worst case scenario MSTV presents should be the appropriate overall standard for evaluating interference protection. In this case, in addition to MSTV's failure to demonstrate more than the merest possibility of interference, commenters have identified, and MSTV does not dispute, significant technical and competitive burdens that would be imposed on PCS licensees in the 1970-1990 MHz band if use of that band were constrained as MSTV proposes. MSTV does not dispute that limiting PCS licensees in that band to mobile use would result in a system configured at odds with customary engineering practice, and so would require distinctive handsets that, moreover, would not be compatible for use with more conventionally configured PCS systems. We view such targeted constraints on licensee's flexibility to use a particular PCS spectrum block as measures to be considered only in extreme circumstances, which MSTV has not demonstrated here. We are confident that the standards already established in this proceeding will serve to protect the broadcast auxiliary service from possible PCS base station out-of-band emissions.[144] We note that, apart from specific attenuation standards, we have authority under Section 24.238(b) of our rules to require any PCS base station which causes interference to other radio services to attenuate its out-of-band emissions substantially. For these reasons, we deny MSTV's petition.

81. As to the revised allocation plan, and possible allocation actions in the MSS proceeding, MSTV asks that in future proceedings the Commission place priority on a spectrum solution for MSS that does not involve relocation or impairment of BAS operations, and that if relocation is required, various measures be implemented toward a reasonable transition period and compensation to broadcasters for relocation costs. These concerns will be fully considered as part of the Commission's impending review of MSS allocation alternatives, but need not be reviewed in this further reconsideration context.

F. Secondary Allocation for MSS

82. CELSAT, INC. (Celsat) petitions for review on spectrum allocation issues. Celsat requests that the 1970-1990 MHz band be allocated on a secondary basis and that the 2160-2180 MHz band be allocated on a primary basis for domestic Mobile-Satellite Service (MSS) use, arguing that its technology would allow it to share these bands with both fixed microwave systems and new terrestrial PCS systems.[145]

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[144] We note that the standard for attenuation of out-of-band emissions to which PCS base stations must adhere is currently stricter than the standard for microwave licensees in the same band. See 47 C.F.R. § 94.71.

[145] See Celsat Petition at 1-4. Because the MSS system would be transmitting to its mobiles in the 2160-2180 MHz band, there would be no interference to the PCS mobiles from MSS satellite transmissions. Celsat claims that the potential interference from MSS mobile transmissions received at PCS base stations would be prohibited by not assigning a potentially interfering frequency to a mobile user whenever it is within range of a microwave or PCS system.

83. Celsat proposes a domestic MSS or hybrid satellite system that would be licensed to provide space-based PCS services nationwide as long as it did not interfere with the operation of any terrestrial PCS system licensed in either PCS Frequency Blocks F or C.[146] Celsat states that its proposal would be spectrum efficient, and that a single handset could access both terrestrial PCS service in served areas and MSS service in areas not served by terrestrial PCS.[147] Celsat states that participating PCS licensees would attain nationwide coverage upon the launch of a single MSS satellite and that this coverage would provide these licensees an immediate competitive advantage over other PCS and cellular licensees.[148] It states that these bands are the only spectrum that is earmarked both domestically and internationally for both ground and space mobile services and thus are ideal for a hybrid space/ground PCS system.[149] Celsat further states that its proposal would cause no interference if licensees in Blocks C and F use the 1970-1990 MHz band for mobile unit transmission. It therefore requests a secondary MSS allocation of this band, and urges PCS licensees in this band to choose the CDMA multiplexing scheme so that MSS and PCS services can efficiently share the band.[150] Celsat's proposal requires not only the secondary MSS allocation at 1970-1990 MHz, but also a primary MSS allocation at 2160-2180 MHz.[151]

84. The 1992 World Administrative Radio Conference (WARC-92) adopted the following allocations for MSS: Region 2 -- 1970-1980 and 2160-2170 MHz primary, 1930-1970 and 2120-2160 MHz secondary; Worldwide -- 1980-2010 and 2170-2200 MHz primary. In the Second Report and Order in the instant proceeding, we allocated the 1850-1970 MHz, 2130-2150 MHz and 2180-2200 MHz bands to terrestrial PCS and reserved the 1970-1990 and 2160-2180 MHz bands for possible MSS use. On reconsideration, we decided to allocate 1850-1990 MHz for PCS, and to reserve 2110-2150 MHz and 2160-2180 MHz for emerging technologies, including MSS.

85. Comments. Two commenters addressed the issues raised by Celsat and the Joint Broadcast Parties, generally opposing any change to our current rules.[152] As an initial matter,

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[146] PCS Block F is 1890-1895 and 1970-1975 MHz; PCS Block C is 1895-1910 and 1975-1990 MHz.

[147] This ability to use a single handset to access both PCS and MSS systems assumes that PCS licensees would employ a handset using a CDMA multiplexing scheme compatible with Celsat's design.

[148] See Celsat Petition at 6.

[149] See id. at 2.

[150] See id. at 5-6.

[151] See id. at 7.

[152] Commenters on Celsat's petition were APC and COMSAT Corporation (Comsat).

COMSAT Corporation (Comsat) argues that the petition of Celsat is not within the scope of this proceeding, because we have indicated that we will address this issues in an upcoming MSS allocation proceeding.[153]

86. With regard to Celsat's proposed allocations for MSS, commenters assert that this proposal would add uncertainty to the quality of PCS services in this band, to the disadvantage of designated entities and entrepreneurial licensees,[154] and would interfere with the ongoing international negotiations regarding MSS issues.[155] Commenters state that the place to consider this issue is the upcoming MSS proceeding.[156]

87. Replies. American Mobile Satellite Corporation (AMSC) joins Comsat in urging the Commission to address spectrum issues in an upcoming MSS proceeding, and urged us to begin this proceeding as soon as possible.[157]

88. Discussion. We agree with commenters who state that this proceeding is not the appropriate place to consider the multiple implications of spectrum allocations for MSS. The Commission is scheduled to release a Notice of Proposed Rule Making in a separate MSS proceeding prior to the December 1994 broadband PCS auction, and that order will consider the issue of authorizing satellite operations in conjunction with broadband PCS.

G. ONA Implementation for PCS

89. Point asks that the Commission require PCS networks to utilize Open Network Architecture, asserting this would guarantee competition among equipment suppliers and reduce the cost of constructing networks.[158] MCI in its comments characterizes Point's request as a plea for the Commission to assert authority over equipment manufacturers, and asserts that the marketplace can best determine the desirability of ONA or other network architecture schemes.[159] No reply comments were filed.

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[153] See Comsat Comments at 2.

[154] See APC Comments, Exhibit 2 at 4-5.

[155] See Comsat Comments at 5-6.

[156] See APC Comments, Exhibit 2 at 5; Comsat Comments at 8.

[157] See AMSC Reply.

[158] See Point Petition at 5-6.

[159] See MCI Comments at 4-5.

90. The elements of an Open Network Architecture regulatory system necessarily reflect the characteristics of the network environment in which those elements are applied. Apart from Point's very general request and a few sentences of MCI's response, the record in this proceeding is nearly devoid of any discussion of the complex technical and operational issues involved. Such a record provides a wholly inadequate basis for assessing the merits of ONA in the wireless telecommunications marketplace. We will therefore deny Point's request, but this action does not preclude Point or other interested parties from filing a more specific and well developed ONA proposal in the form of a petition for rulemaking.

IV. CONCLUSION

91. The adoption of a Memorandum Opinion and Order in the Emerging Technology proceeding a month ago advanced our consideration of transition issues.[160] Today we have amended our service rules in this order to better facilitate the introduction of broadband PCS services to the public. Additionally, we are conducting ongoing consultations with foreign governments to ensure that international coordination requirements for this service will be completed as rapidly as possible. As previously announced, we intend to begin auctioning broadband PCS licenses on December 5, 1994.[161]

V. ORDERING CLAUSES

92. ACCORDINGLY, IT IS ORDERED, that the petitions for reconsideration addressed in this order ARE GRANTED to the extent described above, and DENIED in all other respects.

93. IT IS FURTHER ORDERED, that Parts 2, 15, and 24 of the Commission's Rules ARE AMENDED as specified in Appendix A, effective 30 days after publication in the Federal Register, except that amendments to 47 C.F.R. Section 24.204 as specified in Appendix A SHALL BE EFFECTIVE immediately upon publication in the Federal Register.[162] This action is

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[160] See Memorandum Opinion and Order, ET Docket No. 92-9, 9 FCC Rcd 1943 (1994).

[161] See Public Notice, Commercial Mobile Radio Service Information: Auction Notice and Filing Requirements for 99 MTA Licenses Located on the A and B Blocks for Personal Communications Service in the 2 GHz Band, Report No. AUC-94-04, Auction No. 4, released September 19, 1994.

[162] Amendments to Section 24.204 ease existing regulatory restrictions on entities with non-controlling, attributable cellular interests by providing them an opportunity to participate in broadband PCS auctions from which they previously were barred, and provides all parties with greater certainty about the post-auction divestiture requirements of our cellular/PCS cross-ownership rules. These benefits will be compromised unless the Section 24.204 amendments become effective immediately upon publication in the Federal Register, as the deadline for filing applications to participate in the initial broadband PCS auction is October 28, 1994, less than two weeks from the adoption date of the instant order. Thus, there is good cause to order the amendments to take effect upon Federal Register publication. *See* 5 U.S.C. §§ 553(d)(1), (d)(3).

taken pursuant to Sections 4(i), 7(a), 302, 303(c), 303(f), 303(g), and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154(i), 157(a), 302, 303(c), 303(f), 303(g), and 303(r).

FEDERAL COMMUNICATIONS COMMISSION

William F. Caton
Acting Secretary

Appendix A: Final Rules

Parts 2, 15, and 24 of Chapter I of Title 47 of the Code of Federal Regulations are amended as follows:

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

1. The authority citation for Part 2 continues to read as follows:

AUTHORITY: Sec. 4, 302, 303, and 307 of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154, 302, 303 and 307, unless otherwise noted.

2. Subpart B is amended by revising Section 2.106, the Table of Frequency Allocations, as follows:

a. In Column (4) of the 1850-1990 MHz band, add US331.
b. In Column (4) of the 2110-2200 MHz band, delete US331.
c. In Column (7) of the 1850-1990 MHz band, delete EMERGING TECHNOLOGIES.

PART 15 -- RADIO FREQUENCY DEVICES

1. The authority citation continues to read as follows:

AUTHORITY: Sec. 4, 302, 303, 304, and 307 of the Communications Act of l934, as amended, 47 U.S.C. Sections 154, 302, 303, 304, and 307.

2. Paragraphs 15.323(c)(1) and (5) and 15.323(e) are revised to read as follows:

§ 15.323 Specific requirements for isochronous devices operating in the 1920-1930 MHz sub-band.

* * * * *

(c) * * *

(1) Immediately prior to initiating transmission, devices must monitor the combined time and spectrum windows in which they intend to transmit for a period of at least 10 milliseconds for systems designed to use a 10 millisecond or shorter frame period or at least 20 milliseconds for systems designed to use a 20 millisecond frame period.

* * * * *

(5) If access to spectrum is not available as determined by the above, and a minimum of 40 duplex system access channels are defined for the system, the time and spectrum windows with the lowest power level below a monitoring threshold of 50 dB above the thermal noise power determined for the emission bandwidth may be accessed. A device utilizing the provisions of this paragraph must have monitored all access channels defined for its system within the last 10 seconds and must verify, within the 20 milliseconds (40 milliseconds for devices designed to use a 20 millisecond frame period) immediately preceding actual channel access that the detected power of the selected time and spectrum windows is no higher than the previously detected value. The power measurement resolution for this comparison must be accurate to within 6 dB. No device or group of cooperating devices located within 1 meter of each other shall occupy more than three 1.25 MHz channels during any frame period. Devices in an operational state that are utilizing the provision of this section are not required to use the search provision of (b) above.

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(e) The frame period (a set of consecutive time slots in which the position of each time slot can be identified by reference to a synchronizing source) of an intentional radiator operating in these sub-bands shall be 20 milliseconds or 10 milliseconds /X where X is a positive whole number. Each device that implements time division for the purposes of maintaining a duplex connection on a given frequency carrier shall maintain a frame repetition rate with a frequency stability of at

least 50 parts per millions (ppm). Each device which further divides access in time in order to support multiple communication links on a given frequency carrier shall maintain a frame repetition rate with a frequency stability of at least 10 ppm. The jitter (time-related, abrupt, spurious variations in the duration of the frame interval) introduced at the two ends of such a communication link shall not exceed 25 microseconds for any two consecutive transmissions. Transmissions shall be continuous in every time and spectrum window during the frame period defined for the device.

PART 24--PERSONAL COMMUNICATIONS SERVICES

1. The authority citation for Part 24 continues to read as follows:

AUTHORITY: 47 U.S.C. Sections 154, 301, 302, 303, and 332, unless otherwise noted.

2. Section 24.204 is amended by revising text immediately following the semi-colon in the end of the first sentence of paragraph (f), and by adding new sentences at the end of that paragraph and of paragraph (f)(3)(ii) to read as follows:

§ 24.204 Cellular eligibility.

* * * * *

(f) * * * Provided, however, that these divestiture procedures shall be available only to: parties with controlling or attributable ownership interests in cellular licenses where the CGSA(s) covers 20 percent or less of the PCS service area population; and parties with non-controlling attributable interests in cellular licenses, regardless of the degree to which the CGSA(s) covers the PCS service area population. For purposes of this paragraph, a "non-controlling attributable interest" is one in which the holder has less than a fifty (50) percent voting interest and there is an unaffiliated single holder of a 50 percent or greater voting interest.

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(3)(i) * * * The trustee must divest the property within six months from grant of license.

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3. Section 24.238 is amended to read as follows:

§ 24.238 Emission limits.

(a) On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB.

(b) Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(c) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

(d) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

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

Appendix B

PARTIES

Petitioners

1. Association for Maximum Service Television, Inc. and Capital Cities/ABC, Inc., CBS Inc., Fox, Inc. & Fox Broadcasting Stations, Inc., the National Association of Broadcasters, Inc., National Broadcasting Company, Inc., Public Broadcasting Service, the Radio-Television News Directors Association, and the Society of Broadcast Engineers (collectively, "MSTV")
2. Association of Independent Designated Entities (AIDE)
3. CELSAT, INC. (Celsat)
4. Cellular Telecommunications Industry Association (CTIA)
5. Comcast Corporation (Comcast)
6. Omnipoint Corporation (Omnipoint)
7. Personal Communications Industry Association (PCIA)
8. Point Communications Company (Point)
9. Puerto Rico Telephone Company (PRTC)
10. Spatial Communications, Inc. and ArrayComm, Inc. (SCI/ArrayComm)

Opposing and Commenting Parties

1. American Personal Communications (APC)
2. BellSouth Corp., BellSouth Telecom. Inc., BellSouth Cellular Corp. (BellSouth)
3. Celeritek, Incorporated (Celeritek)
4. COMSAT Corporation (Comsat)
5. McCaw Cellular Communications, Inc. (McCaw)
6. MCI Telecommunications Corporation (MCI)
7. Motorola, Inc. (Motorola)
8. Northern Telecom Inc. (Northern Telecom)
9. Pacific Bell Mobile Services (PacBell Mobile)
10. Pegasus Communications, Inc. (Pegasus)
11. Personal Communications Industry Association (PCIA)
12. Rural Cellular Association (RCA)
13. Utilities Telecommunications Council (UTC)
14. Sprint Corporation (Sprint)

Replying Parties

1.American Mobile Satellite Corporation (AMSC)
2.Ameritech
3.APC
4.AT&T
5.CTIA
6.GTE Service Corporation (GTE)
7.Motorola
8.MSTV
9.Omnipoint
10.PacBell Mobile
11.PCIA
12.PRTC
13.UTAM, Inc. (UTAM)