DOCKET FILE COPY ORIGINAL

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

FCC 93-550

In the Matter of	)	GEN Docket No. 90-314
	)	RM-7140, RM-7175, RM-7618
Amendment of the Commission's	)	PP-6 through PP-10, PP-12,
Rules to Establish New Personal	)	PP-13, PP-15 through PP-20,
Communications Services	)	PP-26, PP-27, PP-41 through
	)	PP-52, PP-54 through PP-68,
	)	PP-70, PP-72 through PP-78

THIRD REPORT AND ORDER

Adopted: December 23, 1993; Released: February 3, 1994

By the Commission: Chairman Hundt not participating; Commissioners Quello, Barrett, and Duggan issuing separate statements.

TABLE OF CONTENTS

	Paragraph
I. INTRODUCTION	1 - 2
II. BACKGROUND	3 - 6
III. DISCUSSION	7 - 301
A. Pioneer's Preferences Granted	7 - 80
1. American Personal Communications	10 - 36
2. Cox Enterprises, Inc.	37 - 50
3. Omnipoint Communications, Inc.	51 - 74
4. License Block	75 - 80
B. Pioneer's Preferences Denied	81 - 301
1. American Portable Telecommunications, Inc.	81 - 88
2. Associated PCN Corporation	89 - 96
3. Atlantic Cellular Company, L.P.	97 - 99
4. Cablevision Systems Corporation	100 - 104
5. Linkatel Communications, Inc.	105 - 106
6. LiTel Telecommunications Corporation	107 - 113
7. PCN America, Inc.	114 - 120
8. Personal Communications Network Services of New York, Inc.	121 - 132
9. Southwestern Bell Personal Communications, Inc.	133 - 138
10. Tel/Logic, Inc.	139 - 143
11. US West NewVector Group, Inc.	144 - 145
12. Vanguard Cellular Systems, Inc.	146 - 147
13. Sharecom-Austin, L.P.	148 - 149
14. Time Warner Telecommunications, Inc.	150 - 156
15. Adelphia Communications Corp.	157 - 158
16. Advanced MobileComm Technologies, Inc. and	

Digital Spread Spectrum Technologies, Inc. 159 - 166
17. American Telephone and Telegraph 167
18. American TeleZone . . . . . 168 - 169
19. Ameritech . . . . . 170 - 175
20. Bell Atlantic Personal Communications, Inc. 176 - 181
21. Broadband Communications Corporation . . . 182 - 183
22. Cable USA, Inc. . . . . 184 - 188
23. Cellular Service, Inc. . . . . 189 - 190
24. Comcast PCS Communications, Inc. . . . . 191 - 196
25. Corporate Technology Partners . . . . . 197 - 209
26. Nextel Communications, Inc . . . . . 210 - 215
27. Freeman Engineering Associates, Inc. . . . 216 - 221
28. Grand Broadcasting Corporation . . . . . 222 - 223
29. Iowa Network Services, Inc. . . . . 224 - 225
30. Omnipoint Corporation, Oracle Data Publishing, Inc., and McCaw Cellular Communications, Inc. . . . . 226 - 227
31. Omnipoint Mobile Data Company . . . . . 228 - 229
32. Pacific Bell . . . . . 230 - 235
33. PacTel Corporation . . . . . 236 - 237
34. PageMart, Inc. . . . . 238 - 243
35. Panhandle Telephone Cooperative, Inc. . . 244 - 245
36. PCN Communications, Inc. . . . . 246 - 247
37. PerTel, Inc. . . . . 248 - 249
38. Pulson Communications Corporation . . . . 250 - 251
39. Qualcomm Incorporated . . . . . 252 - 266
40. Satcom, Inc. . . . . 267 - 273
41. SM Tek, Inc. . . . . 274 - 275
42. Spatial Communications Inc. . . . . 276 - 277
43. Suite 12 Group . . . . . 278 - 284
44. Tele-Communications, Inc. . . . . 285 - 286
45. Telmarc Telecommunications . . . . . 287 - 288
46. TRX Transportation Telephone Co. . . . . 289 - 293
47. Viacom International, Inc. . . . . 294 - 301

IV. PROCEDURAL INFORMATION 302

INTRODUCTION

1. By this action, the Commission recognizes the pioneering efforts of American Personal Communications (APC), Cox Enterprises, Inc. (Cox), and Omnipoint Communications, Inc. (Omnipoint) and grants each a pioneer's preference for a personal communications service (PCS) license. APC is granted a pioneer's preference for its development and demonstration of technologies that facilitate spectrum sharing by PCS and fixed microwave users operating in the 2 GHz band. Cox is granted a preference for its development and demonstration of PCS/cable plant interface technology and equipment that results in a spectrum-efficient application for PCS services. Omnipoint is granted a preference for its development of 2 GHz equipment utilizing advanced techniques that will facilitate the continued development and

implementation of PCS services and technologies. We are denying 47 additional pioneer's preference requests.

2. By virtue of receiving a pioneer's preference, each entity will not be subject to competing applications for a license within a PCS service area. As discussed in paras. 75-80, infra, we are designating for use by each pioneer Channel Block A, 30 megahertz at 1850-1865 and 1930-1945 MHz. APC's service area is the Major Trading Area (MTA) that includes Washington, D.C. and Baltimore, Maryland; Cox's service area is the MTA that includes San Diego, California; and Omnipoint's service area is the MTA that includes northern New Jersey. We note that both PCS channel blocks and service areas are the subject of petitions for reconsideration and clarification.[1] Should either PCS channel blocks or service areas be amended on reconsideration, the pioneer's preferences will be modified accordingly.

BACKGROUND

3. The Commission's pioneer's preference rules provide a means of extending preferential treatment in its licensing process to parties that demonstrate their responsibility for developing new communications services and technologies.[2] These rules are intended to foster development of new services and improve existing services by reducing the delays and risks innovators otherwise would face with the Commission's licensing process.

4. To be granted a pioneer's preference, an applicant must demonstrate that it has developed the new service or technology; e.g., that it has developed the capabilities or possibilities of the service or technology or has brought the service or technology to a more advanced or effective state. The applicant

---

[1] See Public Notice, Report No. 1992, December 13, 1993.

[2] The pioneer's preference regulations are codified at 47 C.F.R. §§ 1.402, 1.403, 5.207 (1992). See Establishment of Procedures to Provide a Preference, Report and Order, 6 FCC Rcd 3488 (1991) (Pioneer's Preference Report and Order); recon. granted in part, Memorandum Opinion and Order, 7 FCC Rcd 1808 (1992) (Pioneer's Preference Recon. Order); further recon. denied, Memorandum Opinion and Order, 8 FCC Rcd 1659 (1993) (Pioneer's Preference Further Recon. Order). We are reviewing our pioneer's preference rules to assess the effect of authority to assign licenses by competitive bidding, see Review of the Pioneer's Preference Rules, Notice of Proposed Rule Making, ET Docket No. 93-266, 8 FCC Rcd 7692 (1993). In the First Report and Order in that proceeding, we decided not to apply any changes to pioneer's preference proceedings in which Tentative Decisions have been made, see FCC 93-551, released January 28, 1994.

also must demonstrate the technical feasibility of the new service or technology, either by submitting a technical feasibility showing or having submitted at least preliminary results of an experiment. Finally, a preference will be granted only if the rules adopted are a reasonable outgrowth of the proposal and lend themselves to grant of a preference.[3] In the Pioneer's Preference Report and Order, we stated: "[I]t will be our general policy to award a preference to any otherwise qualified innovator meeting our standard even if the Commission's final rules for the service are not identical to the innovator's original proposal. However, if the modifications are so significant that the particular innovator does not meet the eligibility standard, we will not award a preference to that innovator." We further stated that "any pioneer's preference would become final (and its scope determined) if final rules are adopted that are generally similar to the innovator's proposal."[4] An applicant meeting the pioneer's preference standard will be placed on a pioneer's preference track, will not be subject to competing applications, and if otherwise qualified will receive a license. Other applicants will compete for additional licenses on a separate track.[5]

5. The first pioneer's preference was awarded to Volunteers in Technical Assistance (VITA) for being the first to develop and demonstrate the feasibility of using a low-Earth orbit satellite system on VHF/UHF frequencies for civilian digital message communications purposes.[6] The second award was made to Mobile Telecommunication Technologies Corporation (Mtel) for developing and testing an innovative new 900 MHz narrowband PCS technology that will increase spectrum efficiency.[7]

---

[3] See 47 CFR § 1.402.

[4] See Pioneer's Preference Report and Order, supra note 2, 6 FCC Rcd at 3495, 3497.

[5] See Pioneer's Preference Further Recon. Order, supra note 2, 8 FCC Rcd at 1659.

[6] See Allocate Spectrum for Fixed and Mobile Satellite Services for Low-Earth Orbit Satellites, Report and Order, ET Docket No. 91-280, 8 FCC Rcd 1812 (1993) (award to VITA).

[7] See Establishment of New Personal Communications Services, First Report and Order, GEN Docket No. 90-314 and ET Docket No. 92-100, 8 FCC Rcd 7162 (1993) (award to Mtel), recon. pending, appeals pending sub nom. BellSouth Corp. v. FCC, No. 93-1518 (D.C. Cir. filed August 20, 1993); Freeman Engineering Associates, Inc. v. FCC, No. 93-1519 (D.C. Cir. filed August 23, 1993).

6. In the Tentative Decision and Memorandum Opinion and Order (Tentative Decision) in this proceeding we noted that 2 GHz PCS has created unprecedented interest in new technologies and services. The Commission received pioneer's preference requests related to 2 GHz PCS from 89 applicants, of which 50 were accepted for consideration.[8] These 50 requests were placed on public notice and comment was solicited on them. In October 1992, we tentatively found that APC, Cox, and Omnipoint merited preferences and that the remaining requests should be denied. A large number of responses were filed to our Tentative Decision. After carefully reviewing these submissions, we conclude that APC, Cox, and Omnipoint meet the pioneer's preference standard and therefore merit award of preferences, and that the remaining requests do not meet this standard and therefore do not merit award of preferences.

DISCUSSION

Pioneer's Preferences Granted

7. APC, Cox, and Omnipoint have led the way in developing specific PCS services and innovative system designs or components. Each applicant has demonstrated the technical feasibility of their designs through development and testing of experimental systems. APC is granted a preference for having developed and demonstrated technologies that facilitate spectrum sharing by mobile PCS and fixed microwave systems at 2 GHz. Such sharing will facilitate implementing new PCS service in a timely manner. Cox is granted a preference for having developed and demonstrated the feasibility of innovatively using cable television facilities as part of the PCS infrastructure. Omnipoint is granted a preference for having designed and manufactured a 2 GHz spread spectrum handset and associated base station equipment.

8. To ensure the integrity of our pioneer's preference policies, we are directing the relevant licensing bureau to condition each 2 GHz PCS license obtained through the pioneer's preference process upon the licensee building a system that substantially uses the design and technologies upon which its

---

[8] The remaining 39 were incomplete and dismissed for failing to provide basic information required by the Commission's rules, see Tentative Decision and Memorandum Opinion and Order, GEN Docket No. 90-314, 7 FCC Rcd 7794, 7809-13 (1992), appeal pending sub. nom. Adams Telcom, Inc. v. FCC, No. 93-1103 (D.C. Cir. filed February 2, 1993). Six additional pioneer's requests relating to 900 MHz narrowband PCS were tentatively denied in the Tentative Decision. These six requests were denied in the First Report and Order in GEN Docket No. 90-314 and ET Docket No. 92-100, supra note 7.

preference award is based. This condition is consistent with our award of a dispositive pioneer's preference. In the Pioneer's Preference Report and Order, we observed that the risk an innovator takes is that it may not be able to translate its developmental work into full business operation. We also observed that an otherwise-qualified innovator would risk that the Commission may not authorize its proposed service.[9] It is inherent in our pioneer's preference policy that the innovator use the technology upon which its preference is based. This condition will apply in the service area for which the preference is being granted and for the initial required five year build-out period[10] specified in the rules for 2 GHz PCS adopted in this docket.[11]

9. Additionally, we require the licensing bureau to condition the grant of 2 GHz PCS licenses awarded under our pioneer's preference rules on holding the license for a minimum of three years or until the construction requirements applicable to the five-year build-out period have been satisfied, whichever is earlier. This condition is consistent with the Commission's policies established in the initial pioneer's preference rulemaking. There, the Commission prohibited transfer of a preference on the grounds that the Commission did not intend to create a "futures market" in preferences.[12] Allowing licensees to transfer pioneer's preference licenses before substantial build-out has occurred would be tantamount to allowing the transfer of the preference, and would subvert the purpose of the pioneer's preference policy to "help ensure that innovators have an opportunity to participate in new services that they take a lead in developing ..."[13] As the Commission recognized in the

---

[9] See Pioneer's Preference Report and Order, supra note 2, 6 FCC Rcd at 3492.

[10] See Second Report and Order, GEN Docket No. 90-314, 8 FCC Rcd 7700 at 7754 (1993); recon. pending. We did not take final action on 2 GHz PCS pioneer's preference requests in the Second Report and Order because of the complexity of the issues in this docket and because we had not completed our review of the relationship between recently-enacted competitive bidding authority to PCS licensing and to the pioneer's preference program. Id. at 7704.

[11] The Commission will consider a waiver only in a case in which there is an overriding national objective that may be thwarted; such as if nationwide PCS interoperability were to be thwarted.

[12] See Pioneer's Preference Report and Order, supra note 2, 6 FCC Rcd at 3496.

[13] Id. at 3488.

initial rulemaking, however, there may be circumstances, such as the sale of the company itself, that would result in the transfer of a preference but would not thwart the Commission's policies.[14] We would not preclude requests for waiver of the prohibition on transfer of licenses under these extraordinary circumstances.

10. American Personal Communications, Inc. (PP-6). APC requests a pioneer's preference for having developed and demonstrated technologies that facilitate spectrum sharing by PCS and fixed microwave systems at 2 GHz. APC argues that its Frequency Agile Sharing Technology (FAST) system, designed to use spectrum that APC demonstrated to be available in the 2 GHz band, will facilitate spectrum sharing by PCS and microwave users.

11. In November 1989, APC filed an application for an experimental license to conduct tests related to PCS. In 1991, APC submitted an examination of existing fixed microwave use of the 1850-1990 MHz band in the 11 largest markets.[15] APC's analysis and testing demonstrate the existence of unused spectrum in the band sufficient to permit initiation of PCS without first relocating existing licensees. The report concluded that enough spectrum is available in the largest metropolitan areas to initiate a commercially viable PCS service if 2.5 megahertz channels are used and "exclusion zones" engineered around existing operations. The exclusion zones were designed to protect existing fixed microwave operations from interference by preventing PCS use of co-channel and adjacent channel frequencies in the proximity of microwave receivers. The boundaries of the exclusion zones were calculated based upon an algorithm that considers three factors:[16] an absolute minimum distance from a microwave reception point in all directions,[17] a minimum

---

[14] Id. at 3496.

[15] See APC's Fourth Progress Report at Appendix I. The markets studied were New York, Los Angeles, Chicago, Washington, Philadelphia, Detroit, Boston, Dallas, Houston, Miami, and San Francisco.

[16] APC's exclusion zone calculations assume a PCS base station transmitting antenna height of 30 feet and transmission at an effective radiated power of 1 watt across the entire 2.5 megahertz channel.

[17] For co-channel frequencies, APC considered any point within 4.0 miles of a microwave station to be in the exclusion zone. For adjacent channels, any area within a radius of 1.6 miles was considered to be in the exclusion zone. Both values

distance in the main beam of the microwave receive antenna,[18] and an assumed main microwave beamwidth.[19]

12. APC developed its FAST technology to permit locating its PCS base stations in a manner that allows using the available spectrum for PCS without an immediate need to relocate microwave incumbents. As explained by APC,[20] FAST is a frequency planning and management tool used to predict (and avoid) interference both between private operational fixed service (POFS) and PCS systems, and within a PCS system. The FAST system utilizes theoretical interference analyses verified by signal strength measurements to determine frequency assignments to PCS base stations. This function is accomplished by a Channel Utilization Controller (CUC), which monitors and determines the channels each PCS base station may use. The CUC monitors coverage and interference; analyzes and integrates measured data; integrates supporting databases; and supports data communications links to each PCS base station. For each PCS base station the CUC calculates theoretical interference values and areas for every POFS station in its database. Both PCS-to-POFS and POFS-to-PCS interference is calculated. The CUC then compiles a list of available channels for each base station. The theoretical interference analysis is recalculated when PCS and/or POFS systems are changed.

13. In addition, the CUC periodically instructs each base station to measure the signal strength of each microwave channel. To accomplish this measurement, the base station receiver tunes to each microwave channel and measures the signal level. The signal strength data is transmitted back to the CUC, which uses the measured data to verify the accuracy of the theoretical interference analysis. After analysis, the CUC downloads to each base station its respective available channel list. APC states that the verification procedure typically would be done on about a monthly basis, more often when the system is first installed and less afterwards.

---

[18] A distance of 25.75 miles was selected to require PCS facilities to be beyond the radio horizon, as viewed from a co-channel receiver. A distance of 14.9 miles was selected for adjacent channel frequencies using empirical interference analyses.

[19] A 10° main beamwidth was selected, based upon the beamwidths of typical microwave receive antennas.

[20] A detailed description of APC's technology is contained in APC's Seventh Progress Report, dated April 28, 1992, and supplemented by other submissions in both this docket and in the experimental file.

14. The specific channel assigned to a call is controlled by a protocol in the call set-up procedure. When a subscriber's PCS mobile unit[21] places or receives a call, the subscriber unit first measures the power on every channel in the available channel list (ACL) (base station transmit, subscriber unit receive), then transmits to the base station on the control channel (base station receive side of channel pair) a request for a voice channel. Also transmitted to the base station are the measurements taken by the subscriber unit on each of the channels in the ACL.

15. PCS base stations continually, i.e., every second, measure signal strengths on every voice channel in the ACL (base station receive, subscriber unit transmit). The voice channels in the ACL are ranked by ascending signal strength, the channel ranked number 1 having the least amount of measurable power. When the base station receives the subscriber unit's measured data, it ranks the subscriber unit's channels according to the same criteria. For each channel, the base station adds the subscriber unit rank to the base station rank and selects the channel with the lowest total rank. The base station then transmits a message to the subscriber unit on the control channel to select the specific voice channel to be used for the call being set up. By this method the best available channel is selected for each call and interference to or from fixed microwave or other PCS operations prevented. Other mechanisms, such as continual monitoring of the carrier to interference ratio by both base station and subscriber unit, are utilized to ensure that high quality communications continue for the duration of the call. This protocol provides an additional measure of protection from interference to ensure that the best available channel is selected for each call.

16. APC states that FAST technology can be used with any relatively narrowband PCS system channel architecture employing a channel bandwidth of 5 megahertz or less. In particular, APC states that the FAST system can be used in conjunction with code division multiple access (CDMA), time division multiple access (TDMA), time division duplexed (TDD), and frequency division duplexed (FDD) systems that use various transmit-receive frequency (channel) separations.

17. Finally, APC states that testing of its FAST/CDMA system verified the ability of its technology to complete PCS calls without causing interference to existing microwave operations. APC maintains that its FAST/CDMA system, operational in downtown Washington, D.C. since October 23, 1992, integrates

---

[21] For purposes of this Report and Order, the term "mobile unit" is used in a generic sense to include "portable unit."

Qualcomm Inc.'s (Qualcomm's) narrowband CDMA system with FAST.[22] The 1.25 megahertz FDD channels employ a transmit-receive separation of 80 megahertz and each PCS base station transmits a pilot signal in each channel.[23] The mobile station scans the base station transmit channels and locks onto the strongest pilot signal, which determines the mobile transmit center frequency.

18. In the Tentative Decision we proposed to grant APC a preference for its development and demonstration of technologies that facilitate spectrum sharing at 2 GHz by PCS and existing fixed microwave licensees. A number of parties oppose our tentative grant to APC.

19. In comments to the Tentative Decision, Bell Atlantic Personal Communications, Inc. (Bell Atlantic) and GTE Service Corporation (GTE) state that APC's proposal is not significantly innovative. Bell Atlantic asserts that APC's FAST method of frequency selection is the only technology it reasonably can claim to have developed and that this technology is unremarkable because it is simply frequency management combined with the dynamic allocation technique used by second generation cordless telephone (CT-2) systems. Bell Atlantic asserts that the Commission already has determined that CT-2 technology does not warrant a preference and, since incumbent 2 GHz licensees can be relocated easily, APC's proposal has little relevance or value in facilitating provision of PCS at 2 GHz.[24] GTE also argues that APC's FAST approach is not unique, and states that FAST works only if unduly large quantities of spectrum are licensed to each PCS operator.[25] GTE states that PCN America, Inc. (PCNA) discussed an approach similar to FAST in its original petition, and that an analogous approach that has existed for many years is the licensing of narrowband Amplitude Compandored Single Sideband (ACSB) systems on interstitial land mobile channels between wideband channels.

20. In response to Bell Atlantic's arguments, APC states that its FAST system uses a combination of theoretical interference and measured data analyses to determine channels that can be used without interference to microwave incumbents.

---

[22] APC's FAST/CDMA system is comprised of three base stations, a Qualcomm Telephone Switching Office, and 24 subscriber units. See APC's Ninth Progress Report.

[23] The pilot uses 20% of the RF energy transmitted on the channel. The remaining 80% is available to transmit the communications itself.

[24] See Bell Atlantic at 6-13 (January 29, 1993).

[25] See GTE at 6-11 (January 29, 1993).

According to APC, its system dynamically adjusts to a changing radio frequency environment. APC argues that the advanced techniques it developed to manage interference both within PCS systems and to and from incumbent microwave users cannot legitimately be described as simply traditional frequency management.[26] Further, APC states that Bell Atlantic's claim that frequency sharing techniques such as FAST will not be needed because the 2 GHz band will be cleared of incumbents fails to consider the transition plan adopted by the Commission in ET Docket No. 92-9.[27]

21. In response to GTE's arguments, APC notes that GTE opposes all of the preference requests and argues that in opposing APC's request GTE merely is adhering to its view that no party merits a preference regardless of the significance of its accomplishments. APC concludes that GTE's comments ignore the full scope of APC's efforts, provide no new evidence or arguments, and should not receive serious consideration.

22. We conclude that FAST is more than an existing frequency management scheme combined with a CT-2 allocation technique; that it permits PCS to be implemented in the same band as microwave users, and permits PCS to share licensed spectrum with these incumbents by utilizing unused frequencies. We do not agree that FAST is similar to PCNA's proposal. The system proposed by PCNA relied upon a completely different overlay technology. We also disagree with GTE that licensing ACSB systems on interstitial land mobile channels is similar or relevant to considering the innovativeness of FAST. The technical problems of designing for spectrum sharing between unlike systems such as fixed microwave and mobile PCS necessarily are substantially different from merely coordinating the frequency use of systems that are in the same service and therefore have a substantial set of similar characteristics. Further, the integration of CT-2 elements such as the call set-up procedure utilized by APC does not detract from this technology; it is only one part of APC's complete system. APC's system provides substantial additional interference protection to both PCS and microwave operations.

23. PCNA, Southwestern Bell Personal Communications, Inc. (SBPC), Personal Communications Network Services of New York,

---

[26] See APC Reply at 5-7 and Attachment A of the Reply at 17-18 (March 1, 1993).

[27] See Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies, First Report and Order and Third Notice of Proposed Rule Making, ET Docket No. 92-9, 7 FCC Rcd 6886 (1992) and Third Report and Order and Memorandum Opinion and Order, ET Docket No. 92-9, 8 FCC Rcd 6589 (1993), recon. pending.

Inc. (PCNS-NY), and Associated PCN Company (Associated) argue that APC has not met the standard for a preference award. PCNA states that its efforts -- and not APC's -- led to consideration of 2 GHz spectrum for PCS. According to PCNA, its petition initiated Commission consideration of PCS.[28] SBPC states that the 1850-1990 MHz band already was under international consideration for PCS; therefore, APC should not be credited with focusing attention on this band. Further, SBPC argues that APC's analysis of unused spectrum in the 2 GHz band is flawed because it did not include co-channel and adjacent channel exclusion zones in the vicinity of the microwave transmitters. SBPC asserts that had APC's study considered these aspects, significantly less spectrum would have been identified as available for PCS. Additionally, SBPC argues that the FAST concept was not revealed until October 28, 1991 -- more than three months after SBPC disclosed the details of its Intelligent Multiple Access Spectrum Sharing (IMASS) system.[29] PCNS-NY states that in its pioneer's preference request filed on July 30, 1991 it originated the proposals governing relocation of existing 2 GHz fixed microwave users that the Commission credits to APC.[30]

24. Associated states that it preceded APC with respect to both the proposal of a frequency-agile sharing technology and field testing of this technology.[31] Associated states that it proposed a frequency agile spectrum sharing technology in its experimental PCS license dated August 17, 1990, whereas APC's first mention of the FAST concept was in its Fifth Quarterly Report submitted in October 1991. Associated states that it conducted the first field tests of its spectrum sharing technology in early October 1991, whereas APC's first testing of the FAST concept occurred in April 1992.

25. With respect to the arguments of PCNA, APC responds that the raw and unanalyzed data supplied by PCNA significantly differs from the detailed and exhaustive analyses contained in APC's July 1991 FAST Report. APC further notes that PCNA's approach is an overlay scheme that would require PCS systems to use the same frequencies as the POFS systems, whereas APC's approach is a frequency agile avoidance system that permits PCS systems to utilize unused POFS spectrum.

26. With respect to the arguments of SBPC, APC responds that its July 1991 FAST Report quantified PCS spectrum

---

[28] See PCNA at 25-27 (January 28, 1993).

[29] See SBPC at 8-13 (January 29, 1993).

[30] See PCNS-NY at 9-12 (January 29, 1993).

[31] See Associated at 6-8, 25-37, 40-47 (January 29, 1993).

availability in the 1850-1990 MHz band utilizing sound engineering criteria for spectrum sharing.[32] APC states that its spectrum sharing study was updated in August 1991 to include co-channel and adjacent channel exclusion zones in the vicinity of microwave transmitters and that its original conclusions were affirmed.[33] APC contends that, in contrast, as late as December 17, 1992 SBPC was still unwilling to quantify PCS spectrum availability or even commit to the feasibility of spectrum sharing.[34] Additionally, APC states that FAST was designed to work in a highly congested microwave environment. Finally, APC states that it initiated its approach to spectrum sharing in March 1990 and first publicly disclosed it in May 1990. APC states that it has been making systematic measurements of the 1850-1990 MHz band since April 1991, when it initiated tests of its first transmitter, whereas SBPC first disclosed the IMASS concept in its July 16, 1991 application for experimental authorization.

27. With respect to the arguments of PCNS-NY, APC responds that APC's approach to sharing spectrum with some microwave licensees and relocating others forms the basis for the transition plan adopted by the Commission in ET Docket No. 92-9.[35] By contrast, APC notes that PCNS-NY's approach is not to share the band, but to clear it entirely of existing users.

28. With respect to the arguments of Associated, APC responds that Associated's proposals are not the same as FAST.[36] APC argues that the entire scope of Associated's developmental activity lies in its attempt to develop a cellular-style hand-off technique for PCS under the rubric of frequency hopping. Additionally, APC argues that Associated's proposal addresses only fixed microwave to PCS interference protection, and that Associated failed to consider PCS to fixed microwave interference. Further, APC reiterates that unlike its own frequency avoidance scheme, Associated's proposal is an overlay scheme. Finally, APC states that Associated has not field tested

---

[32] See APC Reply at 7-9 and Appendix A of the Reply at 43-49 (March 1, 1993).

[33] With the addition of the co-channel and adjacent channel transmitter exclusion zones, the number of grid point locations with at least 50 megahertz of spectrum available for PCS dropped from 96.3% to 95.7% in the top 11 markets.

[34] Citing SBPC's Quarterly Report Number Three.

[35] See APC Reply at 15-16 (March 1, 1993).

[36] See APC Reply at 11-12 and Appendix A of the Reply at 1-16 (March 1, 1993).

an operating PCS system to demonstrate that its proposals will lead to an interference-free, high capacity PCS system.

29. As we noted in the Tentative Decision, while APC was not the first to suggest the 1850-1990 MHz band for PCS, APC's studies focused attention on sharing this band.[37] APC's study was the first to demonstrate the feasibility of initiating PCS operations in this band without first relocating the existing fixed microwave operations. In addition, as set forth by APC, its analysis considered co-channel and adjacent channel interference. Finally, APC clearly stated its intention to geographically share spectrum with POFS stations in its May 3, 1990 application for an experimental license. In the Engineering Exhibit thereto APC stated that it "intends to select microcell locations so as to avoid inter-system co-channel and semi-adjacent channel interference."[38] Additionally, it stated that "[a]ll APC portable units can be prevented from operating in the areas of potential interference near the receive antennas of existing co-channel licensees by the careful location of base stations."[39] Accordingly, to the extent that timing is an issue, the record demonstrates that APC's intentions were revealed before SBPC's disclosure of its IMASS proposal.

30. With respect to the arguments of Associated and PCNA, both parties proposed frequency overlay schemes. We find that such experiments are technically different from a frequency avoidance scheme such as FAST, and therefore there is no need to consider further the requesters' filing timetables. With respect to PCNS-NY, we find that APC proposed a strategy of sharing spectrum with microwave users and relocating some microwave users -- with full cost reimbursement, and only to reliable alternative frequencies -- in its October 1, 1990 comments to the PCS Notice of Inquiry[40] and again in its May 4, 1991 filing in this docket.[41]

31. Corporate Technology Partners (CTP) argues that APC has not developed the capabilities or possibilities of a given technology such as narrow channel CDMA. Instead, CTP argues that APC has developed a way that existing technology, through base station siting and propagation analysis, can be used in "gaps"

---

[37] See Tentative Decision, supra note 8, 7 FCC Rcd at 7797.

[38] See APC's Application for Experimental Radio Service License, 1447-EX-PL-9, at page 6 of the Engineering Exhibit.

[39] Id. at 8.

[40] See Notice of Inquiry, GEN Docket No. 90-314, 5 FCC Rcd 3995 (1990).

[41] See APC's Petition for Rulemaking at 17.

between the fixed microwave transmission paths. CTP submits that it has done far more than APC to adapt base technologies for frequency sharing. Further, CTP states that APC's claim that it developed its FAST concept in March 1990 lacks credibility. CTP notes that in APC's May 1990 experimental license application, APC states that its "proposed CDMA system experiment is not designed to test...interference issues." Moreover, CTP alleges that there is substantial evidence that essential elements of FAST were derived specifically from CTP's prior Interference Sensing Code Division Multiple Access (ISCDMA) work.[42]

32. APC responds that it developed the FAST approach to spectrum sharing and that FAST clearly is distinguishable from CTP's ISCDMA.[43] APC argues that a major way in which FAST differs from CTP's proposal is that FAST has been proven to work in practice through on-the-air demonstration, whereas CTP's approach has not been proven on paper, much less field-tested. APC asserts that the sole technical paper on which CTP relies for the viability of its proposal concludes that "further work is needed" to test the proposal's "reliability in an actual PCS environment."[44] APC also states that CTP's proposal would not effectively protect incumbent microwave users because CTP's system only "senses" interference at initial call set-up and does not continuously monitor and adjust the operating frequency. Additionally, APC states that CTP's proposal would not protect receive-only systems and systems that do not utilize an 80 megahertz transmit-receive separation. Finally, APC states that in its May 3, 1990 application for experimental license it disclosed that its experiment was based on frequency avoidance techniques and designed to test interference issues; and that the statement that CTP quotes refers specifically to PCNA's overlay approach, not APC's avoidance approach.

33. We conclude that APC's FAST is significantly different from CTP's ISCDMA, particularly in that it continues to monitor the channel and can adjust frequency after call set up. We also concur with APC that the technical feasibility of FAST has been demonstrated through an experiment.

34. In the Pioneer's Preference Report and Order, we stated that "proposals that promise to enable the sharing, or co-use, of allocated spectrum may qualify" for a preference.[45] The major challenge that we faced in this proceeding was to design a

---

[42] See CTP at 24-38 (January 29, 1993).

[43] See APC Reply at 16-25 and Appendix A of the Reply at 19-40 (March 1, 1993).

[44] See CTP, Exhibit G at 21 (January 27, 1993).

[45] See note 2 supra, 6 FCC Rcd at 3492.

specific, comprehensive plan to provide spectrum for PCS. We conclude that APC's development and demonstration of technologies that facilitate spectrum sharing by PCS and microwave systems at 2 GHz is a significant communications innovation of the sort the Commission established the pioneer's preference rules to recognize and that APC meets the criteria established by those rules for a preference. This conclusion is based upon two factors: APC's demonstration of unused spectrum, and APC's system that permits using this spectrum to initiate PCS.

35. APC's analysis and testing demonstrated that unused spectrum exists in the 1850-1990 MHz band sufficient to allow immediate initiation of PCS services with no need to immediately relocate existing licensees. APC's July 1991 FAST Report that convincingly demonstrated the existence of this spectrum changed the focus of attention from relocating the existing licensees to frequency sharing. This study, and the transition plan presented in APC's petition for rule making, have elements in common with the transition plan we adopted in ET Docket No. 92-9 to facilitate making available 2 GHz spectrum for emerging technologies, including PCS. Further, we conclude that APC demonstrated that its FAST technology is significantly different from that proposed by other 2 GHz PCS applicants, constitutes more than traditional frequency management techniques, and that APC has demonstrated its technical feasibility. In sum, APC has demonstrated that FAST provides the means of accomplishing a graceful transition from a fixed service environment to a shared fixed and mobile services environment.

36. For the above reasons, we find that APC has demonstrated that its FAST technology is innovative, spectrum efficient, and technically feasible. Its proposal builds on prior developments and brings them to a significantly more advanced and effective state, combining new and existing technologies and utilizing them as the basis for a complete system to provide PCS services on spectrum shared with existing fixed microwave operations. APC has demonstrated the technical feasibility of its proposal, including the underlying technology upon which it relies. Additionally, we find that APC has demonstrated that it developed an innovative proposal that will lead to the establishment of a new service within the PCS family. Finally, we find that the rules we have adopted are a reasonable outgrowth of APC's proposal and lend themselves to a grant of a preference to APC. The PCS service rules adopted earlier in this proceeding and the transition plan adopted in the emerging technologies proceeding[46] both reflect APC's spectrum sharing study and related submissions. Specifically, our allocation of the 1850-1970 MHz, 2130-2150 MHz, and 2180-2200 MHz bands for licensed and unlicensed PCS on a shared basis with existing fixed

---

[46] See note 27, supra.

microwave licensees reflects several APC studies and proposals.[47] Further, our licensing of PCS on an MTA basis reflects a proposal made by APC.[48] Accordingly, we award APC a pioneer's preference.

37. Cox Enterprises, Inc. (PP-52). Cox requests a pioneer's preference for its having developed and demonstrated the feasibility of using cable facilities to provide backbone communications linking PCS microcells; and for its development of the equipment that permits this use. Cox states that it has pioneered advancements essential to the realization of PCS, including the development of equipment (a "cable microcell integrator" (CMI)) that is a critical component of the cable-PCS infrastructure that it envisions.[49] The CMI is an interface, developed under a joint contract with Scientific-Atlanta, that connects individual PCS communications to multiple types of cable television distribution systems.[50]

38. Cox states that in its experimental license application submitted on September 20, 1990, it was the first to propose three specific design criteria central to the introduction of PCS using cable facilities: 1) cable distribution plant as the backbone for a PCS network; 2) centralized instead of distributed modulation; and 3) distributed antennas.[51] Cox now states that it has demonstrated the feasibility of all three criteria. It contends that using cable as PCS backbone facilitates the delivery of PCS to the public quickly and in a spectrum efficient manner. Further, Cox states that centralizing modulation, which entails placing expensive modulation equipment at centralized locations such as cable headends, lowers the overall cost of deploying PCS because of the lower equipment costs for each microcell. Finally, Cox contends that using distributed antennas, which are small, inexpensive, passive antennas that relay the received signals to a central location, lowers the cost of equipment at microcell locations and increases cell coverage areas.

39. On February 12, 1992, Cox employed cable plant to carry a PCS phone call over an operating cable system. To accomplish

---

[47] See note 20, supra, and APC's Request for Separate and Expedited Treatment of "Existing Pioneer Preference" Issues, at note 8 (October 28, 1993).

[48] See APC's Supplement to Petition for Rule Making at 27-34 (May 4, 1992).

[49] See Cox Pioneer's Preference Request at 21 (May 4, 1992).

[50] Id. at 10.

[51] Id. at 4.

this, Cox developed, tested, and used its CMI that receives radio voice channels and modulates and multiplexes the channels onto the cable plant. Cox claims that its equipment permits acquiring a 1.544 megabit per second channel using existing cable plant. The signals can be sent in either direction over the cable plant (to the cable headend or to a PCS microcell), and downconverted to voice channels. According to Cox, its microcell is suitable for placement in the outside pole-mounted cable plant, and includes both a transmitter/receiver and antenna integrated with the CMI. Cox states that this equipment can be used in fiber, copper, or hybrid fiber/copper cable distribution systems.

40. Cox states that in March 1992 it successfully demonstrated cell-to-cell handoff using an operating cable system to connect microcells operating with 2 GHz equipment. SCS Mobilecom, Inc.'s (SCSM's) broadband 1850-1990 MHz equipment was used to communicate between two cells connected to the cable headend. As the mobile handset moved between cells it received signals from both until the handset signaled the headend and cell base stations to switch to the stronger signal.[52]

41. Cox also states that it successfully demonstrated operation of centralized modulation during the March 1992 tests. As explained by Cox, a 2 GHz CDMA signal was received, converted to an intermediate frequency, and transmitted over cable plant to a headend. At the headend the signal was demodulated and connected into the public switched telephone network (PSTN). This, Cox claims, demonstrated the feasibility of centrally locating modulation electronics at the headend and deploying smaller, less expensive equipment at microcells to lower network costs by sharing equipment.[53]

42. Responding to Cox's preference request, CTP acknowledges that Cox has performed significant work on a fiber optic-PCS interface, but states that Cox has not addressed PCS radio technology.[54] GTE argues that Cox's efforts are similar to other experiments, and therefore are not innovative or pioneering.[55]

43. Pacific Telesis Group (PacTel) argues that Cox's proposal to adapt its cable infrastructure to PCS does not merit a preference because Cox's demonstration of an actual call could have been made using any one of a number of current systems being tested. Additionally, PacTel contends that Cox does not address

---

[52] See Cox Report at 3 (June 25, 1992).

[53] Id. at 2.

[54] See CTP at 1 (June 10, 1992).

[55] See GTE at 16 (June 10, 1992).

spectrum sharing at 2 GHz.[56] Viacom International, Inc. (Viacom), while not disagreeing that Cox warrants a preference, states that it is the only cable entity that addresses sharing 2 GHz spectrum with incumbent microwave users.[57]

44. In response to CTP, Cox argues that it tested radio technology by conducting propagation and over-the-air tests with 902-928 MHz and 1.8 GHz equipment, and that this constitutes development of radio-based service. Further, Cox argues that objections based on the development of radio equipment would limit preference awards to equipment manufacturers.[58] In response to PacTel, Cox argues that it addressed spectrum sharing issues in its filings in the PCS proceeding; and that in any event, although spectrum sharing proposals are eligible for pioneer's consideration, the Commission has never implied that spectrum sharing is an essential or necessary component of a preference showing.[59]

45. We concur with Cox that it has addressed appropriately PCS radio technology and spectrum sharing issues in its filings. In the Tentative Decision we proposed to award Cox a pioneer's preference for its proposal to use the cable television plant for connecting PCS microcells and its subsequent development and demonstration of equipment capable of interfacing PCS microcells with copper, fiber, and hybrid copper/fiber cable plant.

46. In response to the Tentative Decision, Nextel Communications, Inc. (Nextel), PCNA, Tel/Logic, Inc. (Tel/Logic), and Viacom express support for granting Cox a pioneer's preference. Additionally, Cablevision Systems Corporation (Cablevision) and Time Warner Telecommunications, Inc. (Time Warner) explicitly do not object to a preference grant to Cox, although each contends that its own proposal is equally or more deserving of a preference.

47. However, Cable USA, Inc. (Cable USA), CTP, Pacific Bell, and Satcom, Inc. (Satcom) contend that Cox should not be granted a preference. These parties argue that Cox was not the first entity to propose using cable television plant to provide PCS and that Cox otherwise does not meet the pioneer's preference criteria.[60] Cable USA, CTP, PacTel, and GTE all take issue

---

[56] See PacTel at 26 (June 10, 1992).

[57] See Viacom at 3 (June 10, 1992).

[58] See Cox Reply at 4 (June 25, 1992).

[59] Id. at 8.

[60] See Cable USA at 6-7, CTP at 19-20, Pacific Bell at 15, and Satcom at 6 (January 29, 1993).

with our conclusion that Cox's request demonstrates innovation. Cable USA claims that Cox tested the same equipment that Rogers Cantel (Rogers) had previously tested in Canada. Pacific Bell states that Manitoba Telephone Service demonstrated the use of cable plant to carry telephone signals in the 1980's.[61] GTE submits that Cox's demonstration used Omnipoint equipment designed to operate in the 902-928 MHz band and therefore should not be attributed to Cox nor considered for a 2 GHz award; and that the CMI was designed by Scientific-Atlanta and appears to be no more than a modulator/demodulator transmitting and receiving voice over a fiber optic cable. GTE also asserts that Cox's distributed antenna/remote antenna driver (RAD) technology was developed in Canada. Finally, CTP states that Tele-Communications, Inc. (TCI) has been carrying phone calls for the military over cable systems for many years.

48. In reply, Cox states that the equipment tested in Canada proved inadequate to meet Cox's requirement for a full-featured PCS system. Cox states that the CT-2 type service tested by Rogers could provide overlapping coverage areas but not call handoff.[62] Further, Cox maintains that the Rogers system connected directly to the PSTN and had no independent switching capabilities. Cox states that from early discussions with potential PCS equipment suppliers it concluded that linking microcells by two-way cable TV systems had not been considered, and that suppliers were focusing on radio technology for the backhaul. Cox asserts that it tested cable and fiber backhaul, both broadband and narrowband, and that readily available modems could not support testing multi-backhaul configurations and multi-PCS links. Therefore, in June 1991 Cox states that it approached Scientific-Atlanta with the CMI concept to provide flexibility for network reconfiguration and connection to various types of PCS radio equipment.[63]

49. We conclude that although CT-2/Cable TV tests were conducted in Canada, Cox was the first to propose using cable for backbone purposes and begin testing actual equipment to demonstrate whether or not the theoretical synergies of PCS and cable systems could be realized through a cost-effective integration of aspects of both networks. We further find that Cox did not merely copy other CT-2/Cable tests having limited capabilities, but rather designed, developed, and tested multi-backhaul configurations and multi-radio PCS systems that incorporated hand-off capability, centralized modulation, and distributed antenna configurations. These capabilities were

---

[61] See Pacific Bell at 15 (January 29, 1993).

[62] See Cox Reply at 32 (March 1, 1993).

[63] Id. at Exhibit D, 5-7.

realized through its design and development work and brought to fruition by the CMI it developed in conjunction with Scientific-Atlanta.[64]

50. Cox has demonstrated the technical feasibility of its concepts by, among other things, initiating a phone call over its system and interfacing PCS microcells with copper, fiber, and hybrid copper/fiber cable plant. Using the existing cable plant in PCS network design permits economical and rapid deployment of PCS systems and substitution of existing infrastructure for increasingly scarce spectrum. Cox has demonstrated that it has "developed the capabilities or possibilities of the technology or service" and has "brought them to a more advanced or effective state"[65] as required by our rules by developing and demonstrating the cable/PCS interface equipment. The efforts of Cox advanced PCS system design by demonstrating the feasibility of integrating cable networks with full-featured PCS systems to offer a spectrum efficient service in a timely, cost effective manner. Finally, the rules adopted in the Second Report and Order are a reasonable outgrowth of Cox's proposal and reflect Cox's experimental cable/PCS efforts in the 1850-1990 MHz band. We note that the PCS Second Report and Order declined to allocate PCS support spectrum, as proposed by several parties, because "many of these support operations can be provided through facilities such as fiber optics, wireline telephone services and coaxial cable, that do not require use of radio."[66] Cox's early efforts in demonstrating how cable facilities can be used in place of additional spectrum to connect PCS microcells was an important component of this decision. Accordingly, we award Cox a pioneer's preference.

51. Omnipoint Communications, Inc. (PP-58). Omnipoint requests a pioneer's preference for its design, development, miniaturization, and deployment of the first 1850-2200 MHz handheld phone. Its equipment utilizes spread spectrum technology with associated CDMA, TDD, and frequency division multiple access (FDMA). Omnipoint claims that its spread spectrum equipment can provide a variety of voice, data, and video services using microcell technology. Omnipoint's equipment was designed to be independent of a specific network architecture

---

[64] Both Cox and Scientific-Atlanta appear to have played key roles in developing the CMI, but apparently under the direction of Cox. As detailed herein, Cox also performed substantial additional work in demonstrating the feasibility of using cable facilities to provide PCS, and in this proceeding Scientific-Atlanta does not dispute Cox's responsibility for the CMI.

[65] See 47 C.F.R. § 1.402(a).

[66] See Second Report and Order, note 10 supra, 8 FCC Rcd at 7741.

and therefore can be used with systems such as Advanced Intelligent Network (AIN), cable television, private branch exchanges (PBXs), and Centrex. Omnipoint claims that the design of its equipment results in less interference to incumbent microwave operations than that of other proposed PCS equipment, and that this permits greater spectrum sharing. Omnipoint's handsets can switch from licensed PCS bands at 2 GHz to unlicensed frequencies at 2.4 GHz. Omnipoint proposes a Common Air Interface (CAI) that will permit its mobile equipment to operate with different network topologies (including one-way, two-way, PSTN, Central Office based networking, AIN, and cable television).

52. Omnipoint contends that operation of its proposed PCS equipment can coexist with other users and fixed microwave operations on the same frequencies with minimum disruption and maximum flexibility. Omnipoint states that these attributes derive from utilizing spread spectrum for its phone instruments, which allows for exclusion zones around microwave towers that are 10 to 100 times smaller than the exclusion zones of equally-powered narrowband systems. Omnipoint argues that other CDMA systems have multiple users transmitting on the same frequency at the same time, which increases the level of interference, while its system is distinguished by its use of TDD to separate users in time. According to Omnipoint, only one unit is transmitting at any one time on a channel, and therefore the unit can operate at lower power and cause less interference. Omnipoint also states that its system has less potential of interfering with microwave operations than a narrowband CDMA system because its system spreads its transmission across 5 or 10 megahertz. Additionally, Omnipoint says that its TDD equipment allows the user to transmit and receive on one 5 or 10 megahertz channel and that its equipment is frequency agile. Omnipoint asserts that using 10 megahertz channels permits its system to match the fixed microwave channelization scheme and the frequency agility permits the system to minimize interference by utilizing unused spectrum.

53. Omnipoint maintains that its coding scheme permits using high data rates per frequency channel and to separate users within a cell by time. Omnipoint states that its system uses frequency offsets and codes to separate cells and that it can operate at a frequency reuse factor of three, or with a frequency reuse factor of one with less capacity. Omnipoint states that its system has flexibility in the number of time slots per user per second used, which permits flexibility in the number of simultaneous users and types of service. Specifically, it says that its TDD technology allows voice and data transmissions on the same frequency. Omnipoint asserts that it does not require precision adjustable power control and continuous soft handoff because its system does not overlay multiple users on the same

frequency at the same time, which it contends gives it an advantage over CDMA-only systems.[67]

54. Omnipoint states that its handsets can switch between the proposed PCS band at 1850-1990 MHz to the existing unlicensed spread spectrum band at 2400-2485 MHz. According to Omnipoint, this capability allows the user to access a base station using unlicensed frequencies while at home or in the office, and to access the PCS network when away from the base station.

55. In the Tentative Decision we proposed to award Omnipoint a preference for having developed 2 GHz equipment that utilizes innovative techniques that may facilitate the development and implementation of PCS services and technologies. We acknowledged Omnipoint's efforts in the areas of: 1) radio frequency engineering and related spread spectrum product design, development, miniaturization, and deployment of equipment; 2) system architecture that facilitates coexistence with other users of the same frequencies; and 3) design and development of a base station interface that is compatible with advanced features of the PSTN.

56. We were persuaded that Omnipoint merited a tentative preference because it was the first to produce practical, working 2 GHz equipment for PCS. Omnipoint's equipment uses direct sequence spread spectrum access techniques in a 5 or 10 megahertz channel.[68] We recognized that there likely will be a number of equipment designs for PCS, some of them significantly different from that developed by Omnipoint in terms of access technique, bandwidth, or size. Nevertheless, we found that the original work of Omnipoint had contributed significantly to the development and testing of PCS services and design concepts.

57. We also stated that the concepts and technological developments pioneered by Omnipoint will facilitate the implementation of PCS in the 2 GHz band and permit sharing with fixed microwave licensees. We tentatively concluded that Omnipoint's design, development, manufacture, and demonstration of spectrum-efficient innovative concepts as set forth in its request for pioneer's preference and its experimental file demonstrate the feasibility of its concepts.

58. In comments to the Tentative Decision GTE argues that Omnipoint did not develop its spread spectrum equipment for PCS

---

[67] Omnipoint states that soft handoff, which permits a mobile to communicate on one frequency to multiple cells at the same time, reduces capacity, and that automatic power control is an added expense.

[68] See Omnipoint's Semi-Annual Experimental License Progress Report, August 1993, at 7.

systems, but rather used the PCS proceeding to translate its technology development into a spectrum authorization.[69] Similarly, GTE and PageMart, Inc. (PageMart) assert that the Commission previously determined that equipment manufacturers generally should not be eligible for a preference unless their technology is linked to a specific service, and according to GTE, Omnipoint's handsets were not developed in association with a licensable service, but rather were developed for unlicensed operations in the Industrial, Scientific, and Medical (ISM) bands (902-928 MHz and 2.4-2.4835 GHz).[70] GTE also asserts that Omnipoint initiated development of its spread spectrum products four years before the May 1991 release of the Pioneer's Preference Report and Order and should not be awarded a pioneer's preference for past innovation.

59. In response to GTE, Omnipoint states that it drew from previous experiences to design a system specifically for PCS and made substantial innovations specifically related to PCS. It contends that while it has been involved with spread spectrum research for some time, it has spent millions of dollars to bring to fruition its PCS innovations, and that these efforts were spurred by the Commission's adoption of the pioneer's preference rules. Omnipoint also argues that GTE's timing arguments have no legal basis because there is no Commission requirement that a pioneer conduct its entire work within any specific time.[71] Regarding GTE's and PageMart's assertions that the preference rules do not extend to innovative technology or equipment development but only to service innovators, Omnipoint responds that its equipment facilitates an innovative service, and that creating a dichotomy between technology and service misconstrues the Commission's pioneer's preference rules.[72]

60. We conclude that Omnipoint has demonstrated that its PCS equipment uses innovative technology that relates specifically to provision of PCS at 2 GHz. Omnipoint has demonstrated the capability of its equipment and has developed a flexible technology that other entities can implement in establishing their PCS systems. We disagree with GTE's argument that Omnipoint's equipment is not associated with a licensable service. Omnipoint as well as other experimental licensees that

---

[69] See GTE at 15-18 (January 29, 1993).

[70] Id. at 15; see also PageMart at 4-5 (January 29, 1993).

[71] See Omnipoint Reply at 17 (March 2, 1993).

[72] Omnipoint argues that its work will lead to the establishment of low cost, wireline quality voice, data, and video services, delivered wirelessly, to pocket-size devices, for use in public and private environments, with a minimum of disruption to fixed microwave users.

have used Omnipoint's equipment have demonstrated that Omnipoint's equipment may be used in either a licensed or unlicensed service. Further, the use of dual mode phones that permit the use of unlicensed frequencies while in business or residential environments and licensed PCS frequencies in public or mobile environments is itself a potential benefit by making efficient use of the available spectrum and providing for equipment use without airtime charges. Further, we disagree with GTE's arguments concerning the timing of Omnipoint's developments relative to our establishment of pioneer's preference rules. Omnipoint has demonstrated that it performed significant new work related to 2 GHz PCS after adoption of the pioneer's preference rules.

61. GTE further contends that the Commission failed to explain why Omnipoint's request should receive a preference in light of deficiencies identified in Omnipoint's two other requests.[73] GTE argues that the Commission's tentative denials of these two requests is inconsistent with the tentative approval of this request because the three filings use the same basic architecture and equipment.

62. Omnipoint replies that the pioneer's preference rules do not provide for a grant to all who use the same technology, but only to those who innovate and do significant work with the technology that leads to a service. Omnipoint asserts that its tentative award, PP-58, should not be linked with the tentatively denied requests, PP-59 and PP-60, because there are obvious fundamental differences among the three proposals. For one, Omnipoint argues that each proposal dealt with a completely different service concept.

63. We conclude that there are substantial differences between Omnipoint's request in PP-58 and the two requests that we tentatively denied. In PP-59 Omnipoint, Oracle, and McCaw proposed a data broadcast service, and in PP-60 Omnipoint Mobile Data Company proposed two-way data communications to mobile devices such as portable computers. We proposed to deny the requests in both PP-59 and PP-60 because the applicants did not demonstrate successfully the technical feasibility of their proposals, or their specific responsibilities for development of identifiable and innovative PCS technologies or services. By contrast, in PP-58 Omnipoint requests a preference for developing 2 GHz spread spectrum equipment that it demonstrated to be capable of being used to provide voice, data, and PCS video services. Omnipoint also demonstrated on the record its

---

[73] Omnipoint filed a pioneer's preference request jointly with Oracle Data Publishing, Inc. and McCaw Cellular Communications, Inc. (PP-59); and Omnipoint Mobile Data Company also filed a preference request (PP-60).