230. Pacific Bell (PP-61). Pacific Bell requests a pioneer's preference based on its development of "Universal Digital Personal Communications Service" (UDPCS) and for spectrum sharing techniques developed by its sister company, Telesis Technologies Laboratory (TTL). Pacific Bell claims UDPCS provides low-cost service, easy implementation, and personalized communications. It also claims that its spectrum sharing techniques are innovative because the cell design permits automatic frequency coordination among contiguous cells, avoiding costly and time consuming frequency coordination. Specifically, according to Pacific Bell, TTL developed an approach for it that is based upon spatial sharing, or the sharing of the same radio resource at the same time but in a different area. Further, Pacific Bell maintains that its use of existing telephone company wireline interfaces simplifies the design criteria for handsets and radio ports, and its use of existing infrastructure creates an economical wireless access system.

231. In comments to Pacific Bell's pioneer's preference request, GTE states that Pacific Bell has not shown an innovation in communications technology but merely advocates connecting well-understood radio technologies to pre-existing wireline technology involving transport and network intelligence.[256] However, PacTel maintains that both it and Pacific Bell have made substantial contributions to PCS development.[257]

232. In the Tentative Decision, we proposed to deny Pacific Bell a preference because the proposal constitutes compilations or aggregations of existing communications technologies or systems or otherwise does not constitute a unique or innovative technology or service proposal.

233. Responding to the Tentative Decision, Pacific Bell contends that its proposed system is not a compilation of existing technologies and that it has been active in its development through joint ownership of Bellcore. Pacific Bell states that it and other Bell Operating Companies (BOCs) funded and directed Bellcore to explore low power digital wireless radio in 1984 and that it and another BOC funded and directed Bellcore to develop a PCS Framework Technical Advisory Group. Pacific Bell maintains that while this was shared research, the sharing aspect does not minimize its claim of innovation. Pacific Bell contends that it is the only owner of Bellcore to combine its research with that of its sister company, TTL.

234. Pacific Bell commissioned Comsearch to compare its preference request with others and Comsearch concluded:

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[256] Id. at 9.

[257] See PacTel Reply at 22 (June 25, 1992).

"By comparison to other Pioneer Preference Requests, the Pacific Bell proposal reads like a text-book profile of a pioneering innovative applicant . . . Pacific Bell has developed a spectrum sharing strategy that is significantly more innovative than FAST."[258] According to Comsearch, FAST assumes ideal and not real world conditions and thus is prone to a high level of interference between PCS and existing microwave users, whereas TTL has developed an approach for Pacific Bell that is based upon spatial sharing. Also in contrast to FAST, according to Comsearch, TTL's spectrum sharing technique takes into consideration one-way links and links that vary from an 80 megahertz spread, resulting in less interference.

235. We find that Pacific Bell has not demonstrated a new or innovative technology. On the contrary, its proposal consists of equipment and technology that existed before and is merely reconfigured. When the Commission developed its pioneer's preference rules, it emphasized that to warrant a pioneer's preference an applicant must present an innovation that involves a substantial change from that which existed prior to the time the preference is requested and demonstrate its responsibility for the innovation.[259] Pacific Bell's "spatial sharing" approach appears to be indistinguishable from the traditional frequency management approach of geographically separating stations. Accordingly, we deny Pacific Bell's pioneer's preference request.

236. PacTel Corporation (PP-62). PacTel bases its pioneer's preference request on work it and its subsidiary, Telesis Technologies Laboratory, have performed with respect to PCS spread spectrum technology. In comments on PacTel's request, GTE argues that other parties have made similar contributions, and that there is nothing innovative about PacTel's request.[260]

237. In the Tentative Decision, we proposed to deny PacTel's pioneer's preference request, finding that its proposal was a compilation or aggregation of existing communications technologies or systems, or otherwise did not constitute a unique or innovative technology or service proposal. PacTel did not respond to the Tentative Decision. Accordingly, we deny PacTel's pioneer's preference request.

238. PageMart, Inc. (PP-63). PageMart requests a pioneer's preference in ten major markets based on its proposed Personal Radio Telephone Service (PRTS). The proposed service would

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[258] See PacTel Reply at 7 (January 29, 1993).

[259] See Pioneer's Preference Report and Order, supra note 2, 6 FCC Rcd at 3494.

[260] See GTE at 9 (June 10, 1992).

employ a 3-tier hierarchy of citywide, building, and picocell coverage and allow two-way voice and data, but without handoff capability. PageMart's handset would operate as a conventional cordless telephone (CT-1 type) at home and a CT-2 type telephone outside the home and would have "public" and "private" modes of operation that could determine the least expensive communications route. "Public mode" would allow access to public cells and could use PRTS airtime whereas "private mode" could initiate and receive calls only from private cells that are connected to the existing wireline network. Calls from public cells, while in private mode, would be received as a page. The PRTS would first attempt to route calls over private cells to avoid airtime costs, with unsuccessful calls routed over public cells. PageMart estimates that the monthly cost of PRTS would be a $10-15 access fee and 10-15 cents/minute for airtime.[261]

239. In comments to PageMart's pioneer's preference request, PacTel states that PageMart has not demonstrated innovation.[262] GTE maintains that PageMart has not demonstrated the technical feasibility of its technology, including the necessary coordination of public and private microcells. Further, GTE claims that PageMart's proposal requires an excessive amount of spectrum and that its cost assumptions are suspect.[263] Viacom argues that PageMart does not justify its request for ten markets to amortize investment in PCS and states that its own economic analysis indicates that the investment can be amortized over a single geographic area.[264]

240. In reply comments, PageMart argues that it merits a preference because its PRTS system will be more ubiquitous, comprehensive, and cost effective than any competing PCS proposal. In response to PacTel, PageMart states that its request is based upon its contribution of an innovative hierarchical network design and simulcast signaling that is independent of any single modulation approach.[265] In response to GTE's arguments, PageMart states that: (1) coordination of public and private microcells can be done by broadcasting channelization information in each cell so that the subscriber unit will always know which channel to seize for call initialization or completion; (2) low cost service can be provided due to increased system capacity with demand; and

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[261] See PageMart Request at 3 (May 4, 1992).

[262] See PacTel at 22 (June 10, 1992).

[263] See GTE at 13 (June 10, 1992).

[264] See Viacom at 20 (June 10, 1992).

[265] See PageMart Reply at 5 (June 25, 1992).

(3) GTE equates spectrum efficiency with size of bandwidth rather than quantity of transmitted information. Finally, in response to Viacom, PageMart asserts that limiting a preference to one geographic area provides insufficient incentive for a pioneer to bring its ideas to the Commission, and would restrict the use of advanced technology by forcing communications to be provided in the least expensive manner to recover cost of investment.[266]

241. In the Tentative Decision, we proposed to deny PageMart's request for a preference because PageMart had not demonstrated the feasibility of the technology or that it had developed the capabilities or possibilities of a specific identifiable PCS technology or service or had brought it to a more advanced or effective state.

242. In its comments to the Tentative Decision, PageMart reiterates that it deserves a preference because it has pioneered an innovative technique of network design and performance that requires little infrastructure investment. In addition, PageMart states that PRTS is worthy of a preference because it uses one universal, lightweight, inexpensive handset and accommodates cordless home telephones, wireless in-building communications, and portable telecommunications; all to a single, personal telephone number.[267]

243. After reviewing the record, we conclude that PageMart has not demonstrated the technical feasibility of its PRTS system and that the PCS rules we have adopted are inconsistent with PageMart's proposal. PageMart stated in its May 4, 1992 Request for Pioneer's Preference that its experimental efforts will enable it to confirm the feasibility of the key elements of PRTS. However, PageMart does not have an experimental authorization at 2 GHz.[268] We cannot conclude from the record that its PRTS technology is feasible. Further, PageMart has not substantiated its claims with technical details concerning its ability to accomplish and implement its proposal; i.e., handset and cellular technologies, modulation type, and frequency coordination. In addition, PageMart has not explained the basis for the cost of service figures on which it relies in its request. Finally, PageMart's request for 60 megahertz is inconsistent with the rules adopted in the PCS Second Report and Order. Accordingly,

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[266] Id. at 7.

[267] See PageMart at 3 (January 29, 1993).

[268] PageMart has four experimental licenses at 930-931 MHz. PageMart states that through its experiment at 930-931 MHz it will verify and refine key system elements and analyze areas of potential trade-offs in a related technology called Personal Information Messaging System (PIMS).

for the above reasons, PageMart's request for pioneer's preference is denied.

244. Panhandle Telephone Cooperative, Inc. (Panhandle) (PP-64). Panhandle requests award of a pioneer's preference for proposing to provide PCS to rural locations in Oklahoma. However, it does not provide specific technical details of its proposed system. In comments to Panhandle's pioneer's preference request, GTE contends that since Panhandle has not tested its proposal, it should not be awarded a preference.[269]

245. In the Tentative Decision, the Commission proposed to deny Panhandle's request for pioneer's preference, concluding that Panhandle had failed to submit either the preliminary results from an experiment or a sufficient showing of technical feasibility. Panhandle did not respond to the Tentative Decision. Accordingly, we deny Panhandle's pioneer's preference request.

246. PCN Communications, Inc. (PCNC) (PP-65). PCNC proposes a PCS system using 50 megahertz of bandwidth utilizing shared PBX technology interfaced with a proposed PCS network. In comments to PCNC's pioneer's preference request, PacTel argues that SCSM and Ericsson Corporation are more worthy of a preference than PCNC for this proposed innovation and recommends denying the request.[270] GTE contends that PCNC's alleged innovation is merely a compilation of other's efforts.[271]

247. In the Tentative Decision, the Commission tentatively rejected PCNC's pioneer's preference request because PCNC's wideband approach was inconsistent with the rules proposed in the Notice. PCNC did not respond to the Tentative Decision. Accordingly, we deny PCNC's pioneer's preference request.

248. PerTel, Inc. (PerTel) (PP-66). PerTel requests a pioneer's preference for its proposal to investigate using CDMA techniques for PCS. In comments on PerTel's pioneer's preference request, PacTel and GTE object to the grant of a preference to PerTel because it has not demonstrated an innovative proposal.[272]

249. In the Tentative Decision we proposed to deny PerTel's request on the basis that its proposed system was a compilation or aggregation of existing communications technologies or

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[269] See GTE at 17 (June 10, 1992).

[270] See PacTel at 14 (January 24, 1992).

[271] See GTE at 19 (January 24, 1992).

[272] Id. See also PacTel at 22 (January 24, 1992).

systems, or otherwise did not constitute a unique or innovative technology or service proposal. PerTel did not respond to the Tentative Decision. Accordingly, we deny PerTel's pioneer's preference request.

250. Pulson Communications Corporation (Pulson) (PP-67). Pulson plans to provide PCS using "impulse radio" -- a technology it says that it purchased from Time Domain Systems, Inc. However, Pulson offers only a sketchy description of what impulse radio is. In comments to Pulson's pioneer's preference request, both PacTel and GTE object to awarding a preference to Pulson because it has not demonstrated the feasibility of its proposed system.[273]

251. In the Tentative Decision, we proposed to deny Pulson's request for a preference because it had not demonstrated the feasibility of the technology, or that Pulson was responsible for developing the capabilities or possibilities of a specific identifiable PCS technology or service or for bringing it to a more advanced or effective state. Pulson did not respond to the Tentative Decision. Accordingly, we deny Pulson's pioneer's preference request.

252. Qualcomm Incorporated (PP-68). Qualcomm requests a pioneer's preference for its development of a digital voice and data system that uses CDMA technology in 1.25 megahertz channels. It contends that its narrowband CDMA system can use spectrum not used by existing fixed microwave operations, and therefore that use of its technology would alleviate the necessity to relocate existing users of the 2 GHz band. Qualcomm argues that FDMA, TDMA, and wideband CDMA will not be able to provide the flexibility required to operate under the technical constraints present in this band.

253. Qualcomm states that its system includes use of a database of existing microwave paths that aids in assigning channels that will not interfere with fixed microwave systems.[274] It asserts that CDMA permits frequency reuse of

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[273] See GTE at 13 and PacTel at 29 (January 29, 1992).

[274] Qualcomm proposes to apply the interference criteria of Bulletin 10E and perform extensive interference tests to determine exclusion zones around microwave receivers. It states that its automatic power control will permit its mobiles to operate at the minimum power necessary, thereby reducing interference. It also proposes to use soft handoff, which permits a mobile to stay on one frequency, but switch the cell if interference occurs in the original cell. It further proposes to use hard handoff, which permits a mobile to change frequencies if interference occurs on the original frequency. Qualcomm claims that implementation of these techniques in conjunction with the

N=1. Qualcomm also proposes a distributed antenna system to deploy picocells in strings connected to the CDMA base stations to provide ubiquitous coverage. The result of these innovations, Qualcomm claims, is that its digital voice and data service is capable of providing ten times the capacity of analog cellular services in the same bandwidth. Qualcomm also asserts that its system is designed to operate in all environments, ranging from densely populated pedestrian to fast-moving vehicular.

254. Qualcomm developed its system for 800 MHz digital cellular applications, but says that it has modified its 800 MHz system to operate in the 1800 MHz range. Qualcomm states that it has tested 1800 MHz CDMA equipment in a wireless local loop application.[275] Qualcomm adds that in the future it will perform interference tests at 1800 MHz to "provide the basis for implementing software changes to the basic CDMA system so that 'coexistence' criteria can be used in PCS operations."[276]

255. In comments filed on Qualcomm's request, GTE asserts that Qualcomm does not satisfy the Commission's requirements for a technical demonstration.[277] Viacom states that the only way Qualcomm's proposed system can share 2 GHz spectrum with existing users and adhere to interference criteria is by not allowing co-channel CDMA transmissions.[278] Viacom contends that coexistence will require a frequency sharing and coordination scheme to prevent CDMA signals from interfering with microwave operations, and asserts that Qualcomm did not adequately address this topic in its filing. Therefore, Viacom asserts that Qualcomm does not merit a preference because it failed to adequately address spectrum sharing and failed to demonstrate the technical feasibility of its proposal.

256. AMT/DSST also oppose granting a preference to Qualcomm, arguing that Qualcomm designed its system for the 800 MHz cellular service.[279] They claim that Qualcomm has announced publicly that its system was developed to be the standard for digital cellular systems and that the CDMA architecture it proposes for PCS differs only in frequency from its proposal for digital cellular. Finally, AMT/DSST assert that

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spreading characteristics of CDMA will permit its PCS network to coexist with microwave systems.

[275] See Qualcomm at 6 (June 10, 1992).

[276] See Qualcomm Request at 9 (May 4, 1992).

[277] See GTE at 9 (June 10, 1992).

[278] See Viacom at 17 (June 10, 1992).

[279] See AMT/DSST Reply at 7 (June 25, 1992).

the technological choices Qualcomm made to meet the needs of cellular systems operating in the 800 MHz range are not optimal for PCS applications. For example, they maintain that Qualcomm's system was designed for large cells and subscriber units that are often mounted or carried in vehicles that move at high speed. AMT/DSST argue that the large cells cause greater multipath problems than small cells and that the mobile speeds require technical complexity to realize cell-to-cell handoff at high speed.

257. Several parties, including PacTel and Bell Atlantic, support Qualcomm's preference request, based on what they maintain is its innovative work in narrowband CDMA.[280] PacTel states that Qualcomm was the first to do this work and show that narrowband CDMA is feasible. Bell Atlantic states that no one disputes Qualcomm's claim of having pioneered the use of CDMA for mobile cellular applications.[281]

258. Qualcomm's reply comments state that Viacom does not fully understand Qualcomm's system. Qualcomm states that it has demonstrated the feasibility of its system and that the system avoids interference by taking advantage of power control, hand-off, frequency agility, digital control channel capabilities, and other features.

259. In the Tentative Decision, we proposed to deny Qualcomm's request for a pioneer's preference. We concluded that Qualcomm's PCS system appeared essentially to be identical to that which it had developed for the 800 MHz cellular bands. We found no evidence that Qualcomm had developed and tested its system at 2 GHz, nor that it was designed or could work in a spectrum sharing arrangement at 2 GHz. We therefore tentatively concluded that Qualcomm did not merit a preference for merely proposing that its existing 800 MHz CDMA system be converted to work at 2 GHz.

260. Responding to the Tentative Decision, Qualcomm states that the Commission misunderstood the innovative nature of its proposal.[282] Qualcomm claims that it does not seek a preference for the radio frequency engineering techniques used to operate its CDMA system in the 2 GHz band. Rather, Qualcomm claims it merits a preference for conceiving, designing, constructing, and testing an end-to-end communications system with unique, patented features including advanced coding and signal processing subsystems, a power control system to reduce

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[280] See PacTel at 10, PerTel at 5, and Pulson at 4 (June 10, 1992).

[281] See Bell Atlantic at 16 (January 29, 1993).

[282] See Qualcomm at 2-4 (January 29, 1993).

mobile power requirements, and a receiver that facilitates soft hand-off and mitigates the harmful effects of multipath.[283] Qualcomm argues that its coding and processing technology permits it to offer frequency sharing and multiple services from a single platform to ensure successful development of PCS, and that it has tested and validated a working 2 GHz PCS system.

261. Qualcomm states that while it did not invent the idea of CDMA, it added significantly to the technology by developing new hardware and software to solve many of the propagation and spectrum sharing problems that have plagued CDMA's use in mobile communications. Qualcomm asserts that it solved the "near-far" problem by using its patented power control system that includes both open and closed loop subsystems and that its signal design and receiver technology mitigate the negative effects of multipath.[284]

262. Qualcomm argues that the Commission's tentative denial of its request, based upon its technology being identical to its cellular CDMA technology, is not germane. It asserts that it should not be penalized for developing a versatile CDMA system that can be used at different frequency bands. Qualcomm argues that because its system was adapted first for cellular use at 800 MHz does not negate the innovative nature of using its system at 2 GHz for PCS. It contends that the Commission did not penalize the other applicants awarded a tentative pioneer's preference for building on and improving existing technologies. Qualcomm also claims that in addition to its work in the traditional cellular configuration, it has implemented microcells, low power picocells, large microcells, and a distributed antenna system to provide ubiquitous coverage. It maintains that its system will provide service to persons in a mobile, pedestrian, and in-building environment providing any combination of voice and data.

263. Qualcomm also states that it has developed distributed antenna and microcell systems for its PCS system.[285] It asserts that its distributed antenna is designed to increase multipath and signal diversity and that it will permit extensive in-building coverage without cell-to-cell handoff, thus providing a low cost and high quality service. Qualcomm also asserts that

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[283] Id. at 3-4.

[284] In a CDMA system, a mobile that is far away from the base station must have the same signal level at the base station as a mobile that is close. In order for a CDMA system to stack multiple users on the same channel with different codes, the users' power levels need to be equalized or the system's capacity is limited.

[285] See Qualcomm Report at 3 (November 4, 1992).

it has developed a microcell extension of the CDMA base station that permits concentrated CDMA coverage in high density or shadowed areas. Qualcomm argues that it has developed hardware and software for base stations, switching, and subscriber equipment that operates in the 1850-1990 MHz band, and states that it has developed its exclusion zone proposal around microwave operations in this band.

264. GTE and CTP offer some support for Qualcomm's comments. GTE argues that the tentative grant to APC without one to Qualcomm is not consistent or logical, given that APC used Qualcomm's equipment in its experimental work.[286] CTP states that it will test Qualcomm's equipment because it is the "simplest, most elegant adaptation that would preserve the innate cost and capacity advantages of CDMA while providing maximum capability for frequency sharing with fixed microwave."[287]

265. In the Tentative Decision, we agreed with AMT/DSST that Qualcomm did not qualify for a preference because many of its innovations were designed for implementation at cellular frequencies. We proposed to deny Qualcomm's request because its narrowband CDMA system essentially is identical to that which it already has developed for use in the 800 MHz cellular bands. This includes the advanced coding, signal processing subsystems, power control system, and receiver, not merely the radio frequency engineering techniques.

266. We continue to believe that most of the technical developments and patents associated with Qualcomm's proposal were developed for implementation of its 800 MHz digital cellular system, and we disagree that adapting this work to the 2 GHz PCS band is innovative. Additionally, the services that Qualcomm proposes are already permitted in the cellular bands. While Qualcomm has done work at 2 GHz on exclusion zones around microwave towers, the use of smaller cells, and remote antennas, after extensive review we have been unable to identify a specific significant aspect of this work that is innovative and for which Qualcomm is responsible. Therefore, while Qualcomm's equipment appears viable for the provision of PCS services, it does not qualify Qualcomm for a preference. Accordingly, we deny Qualcomm's pioneer's preference request.

267. Satcom, Inc. (Satcom) (PP-70). Satcom requests a

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[286] See GTE at 3 (January 29, 1993).

[287] See CTP at 17 (January 29, 1993).

pioneer's preference for developments related to using cable infrastructure in conjunction with cell "stretching" technology[288] to make feasible provision of PCS in less populated and low density areas.[289] Satcom maintains that its innovations are important to the introduction of affordable PCS to rural America. It states that its proposal will: 1) utilize existing cable plant, and thereby minimize the net capital costs of PCS microcell technology; 2) utilize roamer corridors in low-density rural areas to minimize capital investment in base stations and software necessary for call hand-offs; and 3) promote novel business arrangements with long distance carriers to achieve cost-savings.

268. Specifically, Satcom proposes to link microcells using what essentially are repeaters connected to the cable plant, as opposed to installing separate base stations for each microcell. Satcom states that when two or more repeaters (RADs), operate in close proximity and are connected to the same cable plant a distributed antenna pattern (DAP) is formed. According to Satcom, RADs can be linked together along cable plants forming DAPs. Linking DAPs in turn creates what Satcom calls roamer corridors, which link antenna patterns.

269. Satcom states that the primary benefit of roamer corridors is that a user can move within the coverage zone of the RADS/DAPs without call handoff. It maintains that call handoff involves complexity and cost that will be needed only when two roamer corridors adjoin.

270. In comments on Satcom's pioneer's preference request, GTE states that Satcom appears to have established "a colorable claim" to a pioneer's preference, but that the equipment Satcom proposes for its handset is not available and that its request is not supported by a showing of technical feasibility.[290] PacTel asserts that Satcom's proposed cable infrastructure lacks necessary switching capability and standard interfaces.[291] Further, PacTel contends that merely modifying cable infrastructure should not qualify for a preference.

271. In reply comments, Satcom states that it is now using equipment that is readily available and has demonstrated its

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[288] Cell stretching is the term used by Satcom to describe the use of existing CATV systems to increase the service area of PCS cells.

[289] See Satcom's Pioneer's Preference Request at 2 (May 4, 1992).

[290] See GTE at 10 and 13 (June 10, 1992).

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

technical feasibility. Further, it maintains that its claim to innovation is not the handset technology, but its proposed CATV-PCS architecture. Satcom also maintains that PacTel's comments do not consider that using the cable infrastructure was but one facet of the Satcom technical proposal and that PacTel takes no account of Satcom's proposed cell stretching that will facilitate provision of affordable PCS in low density population areas.

272. In the Tentative Decision we proposed to deny Satcom's pioneer's preference request because, while the proposal may have demonstrated an efficient plan to use cable facilities to provide PCS, Cox appeared to have first proposed such integration, developed the necessary hardware, and conducted at least preliminary field trials with actual hardware. In responding to the Tentative Decision, Satcom argues that it is the only cable-based PCS proponent to examine and test PCS in rural settings, and that its proposal complements other cable-based PCS proposals by facilitating provision of low-cost PCS in low density areas that differ, both economically and technically, from the test sites of other applicants in major metropolitan areas. Satcom claims that it meets each of the tests specified in the pioneer's preference rules and that its contribution is virtually indistinguishable from that of Cox; i.e, it has proposed, developed, and tested an efficient PCS network by utilizing existing cable infrastructure.

273. We find that, despite Satcom's characterization of its proposal as innovative, other parties have made similar proposals. In particular, Satcom's proposal uses the cable infrastructure as an integral part of the PCS system to maximize efficiency and reduce cost, and uses the RAD concept. Further, while Satcom has described its stretching technology using cable infrastructure, it has not fully described the PCS system that it plans to connect with the cable plant. For example, no details regarding bandwidth, transmitting power, and type of services to be provided are given. Additionally, Satcom's proposed cell-stretching is inherent in the use of the cable infrastructure for PCS in all areas, and roamer corridors are inherent in the use of the cable infrastructure for PCS in rural areas. Therefore, we cannot conclude that Satcom has developed a PCS technology that is innovative. Finally, novel business arrangements are not relevant to award of a PCS pioneer's preference. Accordingly, for these reasons, we deny Satcom's pioneer's preference request.

274. SM Tek, Inc. (SM Tek) (PP-72). SM Tek requests a pioneer's preference based on its efforts to use frequencies higher than 2 GHz to provide PCS. PacTel and GTE oppose SM Tek's pioneer's preference request, stating that SM Tek has failed to demonstrate the technical feasibility of a new and innovative technology.

275. In the Tentative Decision we proposed to deny SM Tek's request for a pioneer's preference on the basis that its proposed

system was a compilation or aggregation of existing communications technologies or systems, or otherwise did not constitute a unique or innovative technology or service proposal. SM Tek did not respond to the Tentative Decision. Accordingly, we deny its pioneer's preference request.

276. Spatial Communications Inc. (SCI) (PP-73). SCI proposes to provide PCS using a technology it labels "Spatial-Division Multiple Access" (SDMA). SCI claims SDMA will increase spectrum efficiency by a factor of ten by identifying the location of PCS subscribers, permitting directional transmissions. In comments to SCI's pioneer's preference request, PacTel states that SCI's proposal is technically elegant and intriguing and shows great promise. However, both PacTel and GTE maintain that SCI has not demonstrated the technical feasibility of its system.

277. In the Tentative Decision, we proposed to deny SCI's request for a preference because it had not demonstrated the feasibility of the technology, or that SCI was responsible for having developed the capabilities or possibilities of a specific identifiable PCS technology or service or for bringing it to a more advanced or effective state. SCI did not respond to the Tentative Decision. Accordingly, we deny SCI's pioneer's preference request.

278. Suite 12 Group (Suite 12) (PP-74). Suite 12 requests a pioneer's preference for its proposal to use patented technology that it developed for 28 GHz Local Multipoint Distribution Service (LMDS) to implement PCS at 2 GHz. Suite 12 states that its technology can be used for intra- and inter-building wireless communications and to provide a backbone system for PCS.[292] According to Suite 12, its technology enables two-way communications and frequency reuse in both adjacent cells and within a cell. Suite 12 states that it should be granted a pioneer's preference because it has developed a new technology that can provide PCS.

279. Wireless Cable Association International, Inc. (WCA), PacTel, and GTE oppose to Suite 12's pioneer's preference request.[293] WCA questions the ability of Suite 12's technology to accommodate PCS, and also notes that an affiliate of Suite 12, Hye Crest Management, Inc., already has received the equivalent of a pioneer's preference through grant of a waiver to operate in the 28 GHz band. PacTel states that Suite 12's approach raises

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[292] See Suite 12 Request for Pioneer's Preference (May 4, 1992).

[293] See June 10, 1992 filings; GTE Opposition, PacTel Comments, and WCA Opposition.

significant technical questions, including the lack of coverage, delay spread, and scattering, particularly in urban areas. GTE argues that the patented 28 GHz technology proposed for PCS backbone infrastructure by itself does not qualify for a preference to offer PCS service at 2 GHz. Finally, both PacTel and WCA note that Suite 12's innovative claims are already under consideration in the LMDS proceeding[294] and WCA argues that no entity should receive more than one pioneer's preference.[295]

280. In reply comments, Suite 12 states its PCS system can operate at 28 GHz or it can operate as a backbone for PCS operations on other frequencies. With regard to GTE's comments, Suite 12 argues that its proposal is a comprehensive service that can be used in the following ways: 1) as a transport for PCS; 2) as individual multiple mini-cells within a major cell; 3) as a local area network for buildings that cannot be penetrated by typical line of sight frequencies with long wavelengths; 4) as a "last mile distribution" system for cable or fiber networks; 5) as a transport system; or 6) as a fixed or mobile (with interfaced frequencies) system with fiber optic bandwidth capacity. In addition, Suite 12 claims that its system is capable of interfacing with the PSTN; with systems at 900 MHz and 2 GHz; and with cordless telephones. It also claims that its system is capable of interfacing with systems employing data rates greater than one gigabit and that demonstrations of its system at the David Sarnoff Laboratories have illustrated the feasibility of carrying up to 400,000 simultaneous telephone conversations in a cell.

281. With regard to the technical questions raised by WCA and PacTel, Suite 12 states that it has demonstrated all aspects of its system, most of which have been verified by experiments at the David Sarnoff Laboratories.[296] Suite 12 also states that its request for a pioneer's preference for PCS involves different technological advancements than those relied upon in its pending request for a pioneer's preference for LMDS. Specifically, the technology described in the LMDS pioneer's preference request is for a fixed, two-way video, voice, and data service; whereas the

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[294] See Notice of Proposed Rule Making, Order, Tentative Decision and Order on Reconsideration, CC Docket No. 92-297, 8 FCC Rcd 557 (1993) (pioneer's preference tentatively awarded to Suite 12).

[295] Id.

[296] Suite 12 states that it conducted tests in 1991 to ascertain the feasibility of interfacing 900 MHz mobile and 2 GHz PCS band modulators/demodulators with 28 GHz equipment. It says that these tests were witnessed by numerous individuals, including staff of federal regulatory agencies. See Suite 12 Reply at 5 (March 1, 1993).

PCS request results from further research, development, and enhancement of Suite 12's technology. According to Suite 12, these enhancements permit an intra-office/inter-office PCS service, a mobile service with an interfaced frequency such as 2 GHz, and a service in which each subscriber has an individual number which can be used in any cell.[297] Finally, Suite 12 asserts that to prohibit an entity from receiving more than one pioneer's preference defeats the entire purpose of the rules. Suite 12 states that technological innovation and development cannot be limited just because an applicant develops multiple technological and service enhancements.

282. In the Tentative Decision, we proposed to deny Suite 12 a preference because the frequency band requested is not related to the spectrum under consideration. In reply comments, Suite 12 maintains that we mistakenly assumed that its pioneer's preference request was for 28 GHz. Suite 12 states that although its system could operate in other spectrum, it seeks a preference at 2 GHz. It also states that it has researched, developed, and enhanced its LMDS technology to accommodate mobile PCS operations at 900 MHz and 2 GHz. Suite 12 argues that it was only after the preference requests were filed that the Commission announced its intention to utilize 900 MHz and 2 GHz frequencies and contends that to dismiss an application for a preference because the application is for the wrong frequency band when the Commission had not yet specified the band is inappropriate.

283. Suite 12 further argues that its proposal is functionally identical to Cox's and that it provides a solution to the most troublesome drawback of PCS -- the reliable transport of a large volume of information from cell-to-cell (backbone). It compares its solution of using patented wireless communications technology in the 28 GHz band with Cox's solution of using existing cable facilities, arguing that unlike Cox, Suite 12 actually conceptualized and developed the technology that underlies its proposal.

284. We find that there are significant differences between the requests of Suite 12 and Cox. Cox was awarded a preference for not only proposing a CATV system interface with PCS, but also for acquiring the interface equipment, proposing a combined PCS system and CATV facility, and demonstrating the combined system under its experimental test authority. Further, the Cox proposal is an innovation that conserves spectrum because it uses CATV facilities instead of radio without diminishing use of these facilities for CATV. By contrast, the Suite 12 system uses dedicated 28 GHz spectrum for its backbone system. Further, Suite 12 has not demonstrated that its system is technically feasible. Finally, Suite 12 provides no evidence that it has

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[297] See Suite 12 Reply at 7 (June 25, 1992).

performed tests using 2 GHz equipment. Accordingly, for these reasons, we deny its pioneer's preference request.[298]

285. Tele-Communications, Inc. (PP-75). TCI requests a pioneer's preference based on its proposal to integrate PCS and CATV systems. In comments filed to TCI's pioneer's preference request, PacTel and GTE objected to the grant of a pioneer's preference on the grounds that TCI has not demonstrated an innovative technology.[299]

286. In the Tentative Decision we proposed to deny TCI a pioneer's preference because, while the proposal may have demonstrated an efficient plan to use cable facilities to provide PCS, Cox appeared to have first proposed such integration, developed the necessary hardware, and conducted at least preliminary field trials with actual hardware. TCI did not respond to the Tentative Decision. Accordingly, we deny TCI's pioneer's preference request.

287. Telmarc Telecommunications (Telmarc) (PP-76). Telmarc requests a pioneer's preference based on various planned tests including adaptive network management, gateway RF digital front ends, CDMA networks, co-located distributed switch access, and adaptive beam-forming array antennas. However, Telmarc does not describe an identifiable PCS system in its request for a preference. In comments to Telmarc's pioneer's preference request, GTE states that Telmarc's proposal is not innovative and is based on the work of other proponents.

288. In the Tentative Decision we proposed to deny Telmarc's request, finding that Telmarc failed to submit either the preliminary results from an experiment or a sufficient showing of technical feasibility. Telmarc did not respond to the Tentative Decision. Accordingly, we deny Telmarc's pioneer's preference request.

289. TRX Transportation Telephone Co. (TRX) (PP-77). TRX proposes to develop a "Nationwide Transportation Radiotelephone

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[298] With respect to Suite 12's argument that it was only after PCS preference requests were filed that the Commission announced its intention to utilize 900 MHz and 2 GHz frequencies for PCS, the PCS Notice of Inquiry, adopted on June 14, 1990, specifically discussed use of both of these frequency ranges. It further noted that "mobile communications are only feasible on frequencies below 3000 MHz with current technology," and sought "comment on the feasibility of relocating the microwave licensees in the bands 1850-1990 MHz, 1990-2110 MHz, and 2110-2200 MHz." See Notice of Inquiry, GEN Docket No. 90-314, supra note 40, at 3997-98.

[299] See PacTel at 27 and GTE at 16 (January 24, 1992).

Service" (NTRS) that would provide for the communications needs of the U.S. trucking industry and be located only at truck stops and rest areas. TRX proposes to provide two-way voice, two-way mobile data, vehicle location reporting, advanced messaging services, voice mail, mobile facsimile, information services and financial transactions. The TRX network would consist of base stations located at truck stops and rest areas; in-truck equipment; a network central processor; and a satellite delivery system.[300]

290. TRX proposes to use as a signaling protocol for its system the U.S. standard that emerges for PCS. Base stations in truck stops and rest areas would provide communications capabilities around each area. The driver would access the network when within the coverage zone to communicate from anywhere within the zone using a wireless handset. The central processor would handle and route information throughout the network and would be interconnected to each base station by satellite links or data packet networks. Satellite links would be provided by Very Small Aperture Terminals (VSATs) located at the base stations.

291. In comments to TRX's pioneer's preference request, GTE argues that the proposal is not innovative because virtually all aspects of it can be realized using existing services and Part 15 devices.[301] TRX replies that GTE offers no support for its conclusion that the service could be accomplished using existing radio devices. TRX states that no current system can provide the array of services proposed for its system and that the cost of obtaining the same services from multiple providers would exceed the rates TRX contemplates charging for its service.[302]

292. In the Tentative Decision we proposed to deny TRX a preference, concluding that the proposal constitutes a compilation or aggregation of existing communications technologies or systems or otherwise does not constitute a unique or innovative technology or service proposal. In response to the Tentative Decision, TRX states that its proposal combines existing technologies and communications systems; however, it maintains that it would establish an innovative and economical service offering a comprehensive, high quality, nationwide network connecting truck stops and rest areas that is not available from any single provider and that meets an important public need by enabling improved timing, efficiency, and quality of information transfer for the American trucking industry.

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[300] See TRX Pioneer Preference Request at 37-42 (May 4, 1992).

[301] See GTE at 21 (June 10, 1992).

[302] See TRX Reply at 34 (June 25, 1992).

TRX appears to agree that its proposal does not address new technology, but argues that the Commission cannot deny an otherwise meritorious pioneer's preference request on that basis.[303]

293. We conclude that TRX's proposed integration of existing services does not constitute a substantial enhancement to an existing service or an added functionality provided to a broader group of customers, nor does it utilize a new or innovative technology. In addition, the rules to govern PCS adopted in the PCS Second Report and Order do not provide for service areas based upon truck stops or other small, separated areas.[304] Accordingly, we deny TRX's pioneer's preference request.

294. Viacom International, Inc. (Viacom) (PP-78). Viacom's request for a pioneer's preference is based upon a spectrum sharing technique it proposes called "Spectral Zone Coordination" (SZC) and for its proposed "Power Density Principle" (PDP).[305] Its spectrum sharing technique consists of defining a "spectral zone", or specific range of frequencies, around each microwave receiver within which PCS transmissions would be excluded to avoid interference to the microwave receivers. Viacom states that SZC technology merits a preference because "it is a substantial, innovative advancement of recognized spectrum sharing technology that will enhance the capacity to efficiently and economically institute a PCN service capable of prompt nationwide deployment."[306]

295. Additionally, Viacom claims to have developed a method of quantifying the maximum potential interference of PCS systems to incumbent microwave operators by combining propagation laws, cellular cell-splitting concepts, and adaptive power control. Viacom states that its Power Density Principle explains that an initial PCS system will be designed with large cells using maximum power and antenna heights and as traffic grows new cells will be added using lower power. According to Viacom, the interference potential of the expanded system will never exceed

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[303] See TRX pp. 15-19 (December 24, 1992).

[304] TRX may find, however, that it can provide its proposed service using existing technology and Part 15 or cellular services, or in concert with PCS providers licensed to use the 2 GHz band.

[305] See Viacom Request for Pioneer's Preference (May 4, 1992).

[306] Id. at 3.

that of the initially deployed system.[307] Viacom claims that the PDP merits a preference award because "it constitutes the first and only recognition that there actually exists a predictable, finite point at which the worst case harmful interference from a PCS system will occur."[308]

296. Using its SZC and PDP, Viacom proposes to implement a system to provide voice, medium speed data, short messaging, personal numbers, smart cards, and administrative features based upon the DCS-1800/Global System for Mobile Communications (GSM) digital cellular system standard developed in the United Kingdom. The GSM standard is the pan-European digital cellular standard and Viacom states that it is now, or shortly will be, widely supported by equipment vendors in the United States.

297. In comments to Viacom's pioneer's preference request, GTE states that the proposal is based upon models and assumptions that have not been tested. GTE therefore asserts that Viacom has not demonstrated the technical feasibility of its proposal.[309] PacTel argues that since Viacom uses a European standard it has not advanced PCS technology and also agrees with GTE that Viacom has failed to show technical feasibility.[310]

298. In reply comments, Viacom responds to PacTel, arguing that its preference request is not based on the European DCS-1800/GSM standard but instead on Viacom's spectrum sharing methodology. In their reply comments, APC, PacTel, and Time Warner raise additional objections to various aspects of Viacom's proposal. APC and Time Warner suggest that Viacom does not merit a preference because its SZC methodology was developed by Impulse Telecommunications Corporation (Impulse). PacTel raises technical objections, contending that Viacom's proposal: 1) does not consider peak power of mobiles or base station;[311] 2) uses spreading bandwidth to calculate an average power density per grid point, independent of frequency;[312] and 3) calculates exclusion zones incorrectly.[313] Time Warner argues that Viacom's study has several weaknesses, such as using extremely optimistic criteria for determining whether sufficient spectrum

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[307] See Viacom at pp. 6-9 (January 28, 1993).

[308] Id. at 2.

[309] See GTE at 13 (June 10, 1992).

[310] Id.

[311] See PacTel Reply at 7 (June 25, 1992).

[312] Id. at 8.

[313] Id.

is available in a region and failing to recognize the need for frequency reuse.[314]

299. Viacom responds that it has a cooperative relationship with Impulse pursuant to which spectrum sharing technical expertise is provided by Impulse and Viacom provides the cable expertise and financial support.[315] Viacom also maintains that the technical assumptions in the SZC models are biased towards worst case conditions and were developed to analyze sharing feasibility, not to engineer cell sites. In conclusion, Viacom states that "none of these criticisms find important faults with the Spectral Zone Coordination approach or its implementation".[316]

300. In the Tentative Decision we proposed to deny Viacom a preference because its proposal constitutes a compilation or aggregation of existing communications technologies or systems or otherwise does not constitute a unique or innovative technology or service proposal. Viacom responded to the tentative denial, stating that its SZC and PDP proposals merit a preference because they facilitate spectrum sharing between PCS and microwave systems.

301. We find that Viacom has not demonstrated its responsibility for developing a unique or innovative technology or service. Based upon the information in the record, SZC and PDP appear to be compilations of existing technologies. Accordingly, we deny Viacom's pioneer's preference request.

PROCEDURAL INFORMATION

302. Accordingly, IT IS ORDERED that the requests for pioneer's preference filed by American Personal Communications; Cox Enterprises, Inc.; and Omnipoint Communications, Inc. ARE GRANTED. IT IS FURTHER ORDERED that the relevant licensing bureau shall impose the following conditions on the licenses received by American Personal Communications; Cox Enterprises, Inc.; and Omnipoint Communications, Inc. pursuant to their pioneer's preference awards: 1) Each licensee must build a system that substantially uses the design and technologies upon which its preference award is based; and 2) Each licensee must hold its license for a minimum of three years or until the construction requirements applicable to the five-year build-out period specified in Section 99.206 of the Commission's Rules have been satisfied, whichever is earlier. IT IS FURTHER ORDERED That

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[314] See Time Warner Reply at 26 (June 25, 1992).

[315] See Viacom Further Reply at pp. 2-6 (July 8, 1992).

[316] Id. at 9.

the requests for pioneer's preference filed by Adelphia Communications Corp.; Advanced MobileComm Technologies, Inc. and Digital Spread Spectrum Technologies, Inc.; American Portable Telecommunications, Inc.; American Telephone and Telegraph; American TeleZone; Ameritech; Associated PCN Corporation; Atlantic Cellular Company, L.P.; Bell Atlantic Personal Communications, Inc.; Broadband Communications Corporation; Cable USA, Inc.; Cablevision Systems Corporation; Cellular Service, Inc.; Comcast PCS Communications, Inc.; Corporate Technology Partners; Freeman Engineering Associates; Grand Broadcasting Corporation; Iowa Network Services, Inc.; Linkatel Communications, Inc.; LiTel Telecommunications Corporation; Nextel Communications, Inc.; Omnipoint Corporation, Oracle Data Publishing, Inc., and McCaw Cellular Communications, Inc.; Omnipoint Mobile Data Company; Pacific Bell; PacTel Corporation; PageMart, Inc.; Panhandle Telephone Cooperative, Inc.; PCN America, Inc.; PCN Communications, Inc.; PerTel, Inc.; Personal Communications Network Services of New York; Pulson Communications Corporation; Qualcomm Incorporated; Satcom, Inc.; Sharecom-Austin, L.P.; SM Tek, Inc.; Southwestern Bell Personal Communications, Inc.; Spatial Communications; Suite 12 Group; Tele-Communications, Inc.; Tel/Logic Inc.; Telmarc Telecommunications; Time Warner Telecommunications, Inc.; TRX Transportation Telephone Co.; US West NewVector Group, Inc.; Vanguard Cellular Systems, Inc.; and Viacom International, Inc. ARE DENIED.

FEDERAL COMMUNICATIONS COMMISSION

William F. Caton

William F. Caton
Acting Secretary

Separate Statement of Commissioner James H. Quello

In the Matter of Amendment of the Commission's Rules to Establish New Personal Communications Services

I support the decision to award a pioneer's preference to American Personal Communications (APC), Cox Enterprises, Inc. (Cox), and Omnipoint Communications, Inc. (Omnipoint). Each of these entities have contributed significantly to the development of Personal Communications Service (PCS) technology. Awarding these pioneer's preferences will facilitate the deployment of PCS services to the public.

Since the initiation of the personal communication service docket, Congress has changed the rules on the procedures the Commission may use to award licenses. In addition to comparative hearings and lotteries, Congress gave the Commission the authority to license PCS and other services through competitive bidding (auctions) and the Commission has determined that competitive bidding will be used to award PCS licenses. Additionally, the Commission sought comment on how the issue of pioneer's preference should be addressed in a competitive bidding environment.

Today's decision to award three pioneer's preferences in the personal communications service is one of several options the Commission could have taken. For example, the Commission could have awarded the 20 MHz Basic Trading Area (BTA) to the tentative selectees; however, such action would have limited rural telephone companies, small businesses and businesses owned by women and minorities from participating in the offering of PCS services in the New York, Washington, D.C., and Los Angeles areas. Another approach would have had the Commission divide one of the Major Trading Areas (MTA) into BTAs and award the BTAs to the tentative selectees. Such an approach would have been inconsistent with the Commission's PCS allocation scheme and would likely have required another rulemaking. Alternatively, the Commission could have determined that under the competitive bidding scenario the tentative selectees pay a discounted price for spectrum, an option that the Commission may want to consider prospectively. Finally, the Commission could have determined that with competitive bidding, there is no longer a need for pioneer's preferences in the PCS proceeding.

Today's decision is one of fairness and equity. The tentative selectees have invested significant sums of money to further the development of PCS. Furthermore, the tentative

selectees were caught in the middle of rule changes that allow the Commission to award licenses by competitive bidding. Congress gave the Commission authority to continue to use Pioneer's Preference even under the competitive bidding authority. Some will argue that today's decision is nothing more than a give-away of valuable spectrum. In part, these critics are correct. The Commission is granting access to spectrum in selected areas without being subject to competitive bidding. The decision to award pioneer's preferences is based on an existing Commission policy designed to provide incentives to bring new or spectrum efficient technologies to market. Here we may have two policies coming into conflict -- auctions (generating revenues) and pioneer's preferences (incentives to develop new technology and spectrum efficiencies). The Commission in this proceeding is clearly voting to bring new, innovative technologies to market. Needless to say, all licensees will have obligations according to the service rules adopted by the Commission.

With the decision to award pioneer's preferences, the Commission must weigh the consequences with other Commission objectives articulated in the Commission's PCS decision, such as interoperability, roaming, and development of regional and national services. Furthermore, the decision to award these pioneer's preferences should not be construed as prejudging the decision the Commission must make on the future role of pioneer's preferences in those services that are licensed by competitive bidding.

Separate Statement

of

Commissioner Andrew C. Barrett

Re: Third Report and Order in Pioneer Preference for Broadband Personal Communications Services

This Third Report and Order terminates the pioneer preference decision in the Commission's broadband Personal Communications Services [PCS] docket. I support this item because I believe the Commission has a responsibility to fulfill its regulatory responsibilities after creating rules to implement regulations such as pioneer preference. Going forward, I believe the record in the review of our pioneer preference supports the retention of pioneer preference rules in future dockets. To date, I believe our pioneer preference rules have spawned innovative efforts from smaller companies, who might otherwise be precluded by the delay and expense of our experimental licensing and rulemaking processes. Small companies continue to provide innovation in every aspect of our efforts to implement new wireless services and competitive network alternatives. Thus, I believe these rules should be retained, and modified where appropriate, in order to ensure that companies, large and small, engage in a full public dialogue on the innovative services or technologies which they propose to the FCC and the consumer public. The net gain to our public policy and regulatory decisions provided by our pioneer preference rules outweighs the risks identified by various parties in this proceeding.

Separate Statement
of
Commissioner Ervin S. Duggan

Re: Review of the Pioneer's Preference Rules, ET Docket No. 93-266, First Report and Order; Amendment of the Commission's Rules to Establish New Personal Communications Services, GEN Docket No. 90-314 et al., Third Report and Order.

It is no secret that I have long been a skeptic about the wisdom of the FCC's pioneer's preference policy. In this review docket, which sought to confront concerns about whether the pioneer's preference policy made sense in connection with our new auction authority, the proponents of pioneer's preferences have convinced me that the policy has indeed spurred innovation and investment in new technology. I therefore support retaining the pioneer's preference policy, at least for existing tentative selectees. If sparingly awarded, such preferences should help generate the technological innovation that the Commission hoped for when it created the policy.

I always granted that the pioneer's preference policy was noble in concept. My concerns have been limited to the practical difficulties that could arise in implementing the policy. At the outset, I identified several potential dangers: the danger of politicizing awards; the danger of making difficult, hair-splitting decisions about what constitutes true innovation; and finally, the danger of being caught up in endless litigation, which obviously might slow, rather than speed, the commercial advent of new technologies.[1]

The commenters in this proceeding and our actual experience, however, suggest to me that the benefits of the pioneer's preference policy outweigh the dangers it may threaten, at least with respect to those proceedings in which the FCC already has reached tentative or final decisions. And I grant that a decision to award preferences here is true to the expectations that the Commission created when it established the pioneer's preference scheme: that innovators would be rewarded with the grant of a license enabling them to use and profit from their innovations.

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[1] See Amendment of the Commission's Rules to Establish New Personal Communications Services (GEN Docket No. 90-314), Tentative Decision and Memorandum Opinion and Order, 7 FCC Rcd 7794, 7815 (1992); Establishment of Procedures to Provide a Preference to Applicants Proposing an Allocation for New Services (GEN Docket No. 90-217), Report and Order, 6 FCC Rcd 3488, 3500 (1991).