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# EMERGING TECHNOLOGIES AND PERSONAL COMMUNICATIONS SERVICES: REGULATORY ISSUES

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An ongoing revolution in mobile technologies currently exists that could significantly alter our future telecommunications infrastructure. Advancements in digital and wireless technologies are spawning new services, such as personal communications services ("PCS") or personal communications networks ("PCN"), and the development of new mobile equipment, such as second and third generation cordless telephones ("CT-2" and "CT-3") and mobile satellite services ("MSS").<sup>1</sup> Because such developments could significantly expand the future market for mobile services, hundreds of United States' companies are exploring these opportunities.<sup>2</sup> Consequently, efforts to develop new and innovative wire-

less services have increased industry demands for additional spectrum.<sup>3</sup> In response to the increasing demand for mobile services by business and consumers, the Federal Communications Commission ("FCC" or "Commission") has initiated several dockets to address these matters. Before emerging technology services can enter the marketplace, however, the FCC must resolve a variety of complex issues, including spectrum allocation and licensing procedures. This Article examines those issues as well as related issues that the Commission will face as it proceeds to authorize PCS services. To the extent that Congress, the FCC, state utility commissions and industry can resolve those issues in a

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The opinions and views expressed in this article are solely those of the authors and do not represent those of the Federal Communications Commission.

<sup>1</sup> See *In re* Amendment of the Commission's Rules to Establish New Personal Communications Services, *Notice of Proposed Rule Making and Tentative Decision*, 7 FCC Rcd. 5676, para. 3 (1992) [hereinafter *PCS NPRM*]. The PCS Docket involves

services in the 2 GHz microwave band and the 900 MHz narrowband service. This article reviews the issues involved in the 2 GHz band services only. See *Chief Engineer's View; PCS Proceedings May Be Separated and Auction Plan Accelerated*, COMM. DAILY, Feb. 24, 1993, at 5 (discussing that the FCC might be separating the proceedings for several elements of PCS).

PCN is a proposed advanced voice and data communications system that would be independent of the existing wireline public switched telephone network and cellular systems. *PCS NPRM*, *supra*, para. 18 n.16. A CT-2 device is a digital telephone that functions as a cordless telephone at home and in the office. *Id.* CT-3 includes control channels that permit the handset to receive and initiate calls. *Id.* MSS include the Commission's ongoing efforts to license new low-earth orbit ("LEO") satellite service providers. LEO providers will be licensed to provide mobile data and voice services via satellite communications. Some LEO service providers will operate in bands below 1 GHz, while others will operate in bands above 1 GHz. A geo-stationary satellite consortium is also providing MSS data services.

<sup>2</sup> See *In re* Amendment of the Commission's Rules to Establish New Personal Communications Services, *Notice of Inquiry*, 5 FCC Rcd. 3995, para. 2 (1990) [hereinafter *PCS Notice of Inquiry*].

<sup>3</sup> See *In re* Amendment of the Commission's Rules to Establish New Personal Communications Services, *Policy Statement and Order*, 6 FCC Rcd. 6601 (1991) [hereinafter *PCS Policy Statement*].

timely fashion, PCS could become a reality in the United States near the middle of this decade. If the regulatory and policy issues become too fragmented, however, the commencement of PCS services could be delayed.

## I. BACKGROUND OF PERSONAL COMMUNICATIONS SYSTEMS

### A. PCS Defined

The FCC proposes to define PCS as a family of mobile and portable radio communications services that will enable individuals to communicate from any place and at any time.<sup>4</sup> A primary feature associated with PCS will be its small "pocket" size, lightweight communications device. That feature will allow PCS proponents to provide a more portable, person-to-person communications service.<sup>5</sup> In the past, cordless and cellular telephones have been limited in their operating distance from a base unit. In the case of cordless telephones, the mobile handset generally has operated within a limited range of the base unit. Similarly, cellular telephone handsets generally have operated within a limited range between a vehicle base unit and various cell sites. Today, cellular technology is evolving towards a more portable digital communications environment, thus expanding the range of personal mobility.<sup>6</sup>

Proponents of PCS envision that the subscriber's handset will operate in many different environments. Theoretically, a subscriber will be able to place calls from a single handset to any location in a city or region. To a certain extent, industry agreements on technical and operating standards between various PCS networks will determine the portability of PCS devices. In that regard, equipment compatibility and operating protocols will be critical factors. A customer's ability to use a single PCS phone number from any location will also impact PCS portability.<sup>7</sup> Commission oversight of the North American Numbering Plan will be crucial to the development of

that feature.<sup>8</sup>

Another significant characteristic of PCS could be the development of "microcell" technology in the 2 GHz microwave band.<sup>9</sup> Cellular and enhanced specialized mobile radio service ("SMR")<sup>10</sup> providers in the 800 and 900 MHz bands are currently developing microcell applications. Microcell technology permits the deployment of cell sites that are significantly smaller in their coverage area. With more cell sites, frequencies can be reused more often, thus increasing system capacity.<sup>11</sup> In addition, with smaller cell sites, the power requirements to operate the handset will be reduced, allowing smaller batteries to power the handset and subsequently, smaller, lightweight portable communications devices.<sup>12</sup>

### B. Need for PCS and Emerging Technology Spectrum

PCS mobile communications could free business and residential consumers from the "physical constraints of a wholly wired telecommunications network."<sup>13</sup> In addition to this functional utility, the need to promote PCS development is also important for the following other reasons. During the 1970s, the Commission reallocated a large amount of spectrum that was primarily used by land mobile technologies, including common carrier cellular radio and private trunked operations.<sup>14</sup> That reallocation allowed American companies to pioneer and lead the world in mobile telecommunications products, strengthening the United States' competitiveness in international markets.<sup>15</sup>

In order for the United States to maintain its position in PCS, it is important that the FCC avoid undue delay in adopting regulations that will facilitate the introduction of these services into the domestic marketplace. Regulators and policy-makers must remain aware that the international community is moving to establish PCS operations in their own markets.<sup>16</sup> During 1992, the World Administrative

<sup>4</sup> See *id.*

<sup>5</sup> See *PCS Notice of Inquiry*, *supra* note 2, para. 3; see also STATE OF N.Y., DEPT. OF PUB. SERVICE, PERSONAL COMM. SERVICES REP. Oct. 1991, at 7-8 [hereinafter STATE OF N.Y.].

<sup>6</sup> See generally DONALDSON, LUFKIN & JENRETTE, THE CELLULAR COMMUNICATIONS INDUSTRY, Winter 1992-93, at 6 [hereinafter DONALDSON]; see also *Fifteen Wireless Cellular Carriers Establish Brand Name Service*, TELECOM BULL., Feb. 19, 1993, at 2-3.

<sup>7</sup> STATE OF N.Y., *supra* note 5, at 3.

<sup>8</sup> For a discussion of the North American Numbering Plan, see *infra* note 115 and accompanying text.

<sup>9</sup> STATE OF N.Y., *supra* note 5, at 3.

<sup>10</sup> For further information on SMR in the Private Radio Service, see FCC FACT SHEET, CONSUMER ASSISTANCE AND SMALL BUSINESS DIVISION, OFFICE OF PUBLIC AFFAIRS, *Specialized Mobile Radio System* (Feb. 1989).

<sup>11</sup> See STATE OF N.Y., *supra* note 5, at 3.

<sup>12</sup> *Id.*

<sup>13</sup> *PCS NPRM*, *supra* note 1, para. 2.

<sup>14</sup> *Id.* para. 22.

<sup>15</sup> *Id.*

<sup>16</sup> *Id.* para. 27.

Radio Conference ("WARC-92") allocated spectrum on a global basis for future public land mobile telecommunications services ("FPLMTS").<sup>17</sup> Thus, other parts of the world, particularly Europe, Asia and Latin America, are pursuing mobile communications service markets more aggressively.<sup>18</sup>

The implementation of PCS services is also important because it could bring additional competition to the current domestic mobile radio services market.<sup>19</sup> Competition to existing cellular, paging and private radio services could result in lower consumer prices for those services, as well as an increase in the efficiency of those mobile service operators.<sup>20</sup> To the extent PCS is developed in various network configurations, it may provide an additional resource for communications during emergencies, such as hurricanes or earthquakes or during incidents involving personal safety.<sup>21</sup>

### C. Consumer Demand for PCS

Studies reveal that factors which affect the level of consumer demand for PCS include price, type of service, handset size, mobility, range of use and quality of service.<sup>22</sup> Of those variables, price is likely to have a significant influence on residential demand. Surveys indicate considerable demand for services priced at \$30 to \$40 per month, with demand decreasing sharply as the price increases above \$40 per month.<sup>23</sup>

Features associated with the handset will also affect demand, and include lightweight handsets, pocket-sized handsets, low-cost handsets and long battery life.<sup>24</sup> The amount of personal mobility offered on a PCS system in any geographic area may also influence market demand. Some PCS systems may provide service to smaller areas only, such as local neighborhoods or buildings. Other systems may provide service throughout an entire region or even

nationwide.<sup>25</sup> As the range of services expands, both residential and business customers are likely to show increased interest in PCS.

The types of services provided will also affect demand. Currently, it is unclear what type of PCS services consumers will want. The range of services, however, could include wireless data and fax transmissions in a local area network, in-building mobile services or high-speed mobile services in an automobile.<sup>26</sup> As the range of options increases, one can speculate that two primary consumer uses for PCS will be personal emergency situations and routine communications between friends or family.<sup>27</sup> This trend already is occurring in the cellular industry, which is offering more personalized pocket mobile phones to consumers.<sup>28</sup>

### D. The Commission's Involvement in PCS

As the PCS Docket evolves, the FCC must define the domestic market framework for PCS in some combination of local, regional, or national markets. It must also develop flexible operating standards that will allow multiple service providers to compete in those various PCS markets.<sup>29</sup> Since 1990, the Commission has been exploring various issues that will form the basis for the domestic PCS framework. This section summarizes the various FCC dockets that will impact the development of PCS.

The PCS inquiry began in June 1990 when the FCC initiated a series of broad public policy questions relating to the development of new personal, wireless communications services in the United States.<sup>30</sup> The issues identified in the *PCS Notice of Inquiry* included: the definition of PCS services; the allocation of spectrum; the identification of appropriate technical characteristics; the development of eligibility requirements for PCS licenses; and the determination of whether services should be regulated as

<sup>17</sup> See Addendum and Corrigendum to the Final Acts of the World Administrative Radio Conference (WARC-92), Malaga-Torremolinos, 1992, at 17 [hereinafter WARC-92]; see also Preliminary Copy of the WARC Final Acts Available, *Public Notice* (Apr. 16, 1992). FPLMTS, which is a concept similar to PCS, received a worldwide allocation in the 1885-2025 and 2110-2200 MHz bands. Other services can also use the bands that are allocated within them, i.e., fixed, mobile satellite and space research. See *PCS NPRM*, *supra* note 1, para. 17.

<sup>18</sup> *PCS NPRM*, *supra* note 1, para. 17 n.14.

<sup>19</sup> *Id.* para. 26.

<sup>20</sup> *Id.*

<sup>21</sup> *Id.*

<sup>22</sup> STATE OF N.Y., *supra* note 5, app. C at 7.

<sup>23</sup> *Id.*

<sup>24</sup> *Id.* app. C at 7-8.

<sup>25</sup> *Id.* app. C at 8. Recently, AT&T and MCI announced their intentions to invest in local wireless communications services. Those investments could implicate the development of integrated nationwide wireline and wireless cellular on PCS networks. See Mary Lu Carnevale, *AT&T-McCaw Link Stuns Baby Bells*, WALL ST. J., Nov. 6, 1992, at B1, B14; Cindy Skrzycki, *MCI Enters Wireless Phone Race*, WASH. POST, Nov. 10, 1992, at B1, B6.

<sup>26</sup> STATE OF N.Y., *supra* note 5, app. C at 9.

<sup>27</sup> See *id.* (citing Arthur D. Little).

<sup>28</sup> See generally DONALDSON, *supra* note 6, at 21-22.

<sup>29</sup> See *PCS Policy Statement*, *supra* note 3, para. 3.

<sup>30</sup> See *PCS Notice of Inquiry*, *supra* note 2.

private carriers or common carriers.<sup>31</sup>

More than 5,000 pages of comments were filed in the initial and reply rounds in response to the *PCS Notice of Inquiry*.<sup>32</sup> Most of the commenters indicated that there will be increasing consumer demand for wireless telecommunication services.<sup>33</sup> Cable television providers, microwave common carriers, private radio entities, local exchange carriers and cellular telephone companies all indicated an interest in the development of PCS.<sup>34</sup> However, divergent views were expressed regarding the appropriate threshold for service and technical issues, and the extent to which PCS should be integrated into the U.S. wireline telecommunications infrastructure. Local telephone companies generally view PCS as a means of extending the reach of the local public switched telephone network.<sup>35</sup> Long distance companies, such as MCI, view PCS in a national framework integrated with the long distance networks. Cellular companies generally perceive PCS as an adjunct to their local or wide-area cellular networks. New PCS and CT-2 proponents regard PCS as everything from in-building wireless PBX services to stand-alone, full-service mobile communication networks.<sup>36</sup>

In October 1991, the Commission adopted a *Policy Statement and Order* ("*PCS Policy Statement*") to provide preliminary guidance for the development of PCS in the United States and to serve as a basis for an *en banc* hearing on PCS.<sup>37</sup> In the *PCS Policy Statement*, the FCC acknowledged the need to set the framework for PCS by making available an adequate amount of spectrum. The FCC stated that important equipment cost and international service factors pointed toward the 1.8 to 2.2 GHz band ("2 GHz band") as the appropriate band for PCS.<sup>38</sup> The 2 GHz band is currently allocated to fixed microwave users,<sup>39</sup> such as utility companies. To eventually accommodate multiple PCS licensees in a clear 2 GHz band, fixed microwave users in the 2 GHz band will need to be relocated to other spectrum bands, as long as public safety services are not

effected by such actions.<sup>40</sup> The Commission recognizes that reallocating the 2 GHz band for new PCS services creates serious dislocation and cost concerns for existing fixed microwave incumbents. Thus, the FCC has been involved in efforts to address these relocation matters.<sup>41</sup>

On December 5, 1991, the Commission held a PCS *en banc* hearing to further develop the Commission's PCS record.<sup>42</sup> Testimony covered topics including: the definition of PCS services; the type of PCS services anticipated and the potential demand for each service type; spectrum requirements, including the amount of spectrum required, where it should be located in the spectrum, and the technical flexibility that should be granted PCS licensees; the role of unlicensed devices; and the need for mandated technical or operational standards.<sup>43</sup> Additional regulatory issues included: the method of assigning licenses; the appropriate size and location of PCS service areas; and the advantages and disadvantages of common versus private carriage for PCS.<sup>44</sup> Comments in response to the *PCS Policy Statement* and *en banc* hearing confirmed that there was a significant interest for finding adequate spectrum for PCS services. Comments by incumbent 2 GHz band microwave licensees, however, indicated strong skepticism about the feasibility of spectrum sharing with new PCS services, and raised concerns about potential adverse effects of new PCS services on current microwave operations.<sup>45</sup>

During the summer of 1992, the FCC adopted a *Notice of Proposed Rule Making and Tentative Decision* ("*PCS NPRM*") seeking comprehensive comments on how the Commission should structure the regulatory treatment of PCS, including a variety of possible spectrum allocation and licensing schemes.<sup>46</sup> Subsequently, the Commission adopted a *Further Notice of Proposed Rule Making* ("*Further Notice*") which proposed to reallocate five bands above 3 GHz to private and common carrier fixed microwave use on a co-primary basis.<sup>47</sup>

<sup>31</sup> *Id.* para. 1.

<sup>32</sup> See Comments to *In re* Amendment of the Commission's Rules to Establish New Personal Communications Services, in Gen. Dkt. No. 90-314 (1990) [hereinafter *PCS Comments*] (Comments on file at the FCC, Washington, D.C.).

<sup>33</sup> *Id.*; see also *PCS NPRM*, *supra* note 1, para. 9.

<sup>34</sup> See *PCS Policy Statement*, *supra* note 3, para. 2.

<sup>35</sup> See *PCS Comments*, *supra* note 32.

<sup>36</sup> *Id.*

<sup>37</sup> *PCS Policy Statement*, *supra* note 3, para. 1.

<sup>38</sup> *Id.* para. 4.

<sup>39</sup> See 47 C.F.R. pt. 21. (1992).

<sup>40</sup> *PCS Policy Statement*, *supra* note 3, para. 4.

<sup>41</sup> *Id.*

<sup>42</sup> See *PCS NPRM*, *supra* note 1, paras. 14-15 (discussing the *en banc* hearing).

<sup>43</sup> *Id.*

<sup>44</sup> *Id.*

<sup>45</sup> See *PCS Comments*, *supra* note 32; see also *PCS NPRM*, *supra* note 1, para. 15.

<sup>46</sup> *PCS NPRM*, *supra* note 1, para. 1.

<sup>47</sup> See *In re* Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies, *Further Notice of Proposed Rule Making*, 7 FCC Rcd. 6100, para. 1 (1992) [hereinafter *Further Notice*].

In September 1992, the Commission adopted the *First Report and Order and Third Notice of Proposed Rule Making* ("Emerging Technology Order"), representing the Commission's ongoing effort to identify spectrum suitable for stimulating the development of new wireless services.<sup>48</sup> In the *Emerging Technology Order*, the Commission allocated 220 MHz of the 2 GHz spectrum for emerging technologies and proposed a transition framework designed to minimize disruption to incumbent 2 GHz fixed microwave licensees. That allocation provides the basis for a wide range of potential new services, including personal communications services, data-PCS and other future mobile services.<sup>49</sup> Several important aspects of the *Emerging Technology Order* include: (1) the need for spectrum redevelopment for emerging technologies; (2) relocation or sharing arrangements with 2 GHz fixed microwave services; (3) a proposed transition period of three to ten years commencing with the completion of the rechannelization of bands above 3 GHz; (4) compensation requirements for PCS service providers who seek to move fixed users from the 2 GHz band and provide comparable facilities where relocation to bands above 3 GHz is necessary; (5) the potential for negotiated rulemaking on issues of comparability and tax certificate compensation issues; and (6) general guidelines to prevent harmful interference to existing fixed microwave users under any spectrum sharing scheme.<sup>50</sup>

In October 1992, the FCC awarded tentative pioneer preferences to three parties for their PCS developmental efforts in the 2 GHz band.<sup>51</sup> This preferential license grant is offered to parties who have developed and proposed innovative improvements or new services in the field of communications.<sup>52</sup>

<sup>48</sup> *In re Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies, First Report and Order and Third Notice of Proposed Rule Making*, 7 FCC Rcd. 6886 (1992) [hereinafter *Emerging Technology Order*].

<sup>49</sup> *Id.*

<sup>50</sup> *Id.*; see also *Action in Docket Case-FCC Allocates Spectrum for Use by Emerging Telecommunications Technologies* (ET Docket No. 92-9), FCC News, Sept. 17, 1992.

<sup>51</sup> See *In re Amendment of the Commission's Rules to Establish New Personal Communications Services, Tentative Decision and Memorandum Opinion and Order*, 71 Rad. Reg. 2d (P & F) 683 (1992) [hereinafter *Pioneer Preference Order*].

<sup>52</sup> See *Action in Docket Case-FCC Tentatively Awards Pioneer's Preferences to Three Applicants for New Personal Com-*

## II. REGULATORY ISSUES: REALLOCATION OF SPECTRUM

During 1993, the FCC will need to address several concerns as the *Emerging Technology Order* and PCS Dockets continue to evolve. There are a large number of proposals to operate various types of PCS systems. These proposals raise complex regulatory issues with respect to economic and technical concerns. A goal of the FCC must be to resolve those issues in a methodical and forthright manner. One of those primary issues is the impact of delay and relocation of incumbent users in the reallocation of spectrum.

### A. The Potential Impact of Delaying Spectrum Reallocation and PCS Licensing

Addressing the issue of spectrum reallocation in a timely manner is critical in order to avoid delay. Potential market opportunities for PCS service providers and manufacturers could be lost, both in the United States and abroad, if PCS licensing is unduly delayed. This concern was exemplified by recent studies that analyzed the impact of delay on the launch of cellular services in the U.S. It was estimated that regulatory delay in launching cellular service during the 1970s and 1980s cost the U.S. economy \$86 billion in jobs and market activity.<sup>53</sup> The Commission must therefore endeavor to authorize PCS in a process that does not become subject to undue regulatory delay.<sup>54</sup>

Telocator, an association representing paging and PCS companies, highlighted the potential impact of delay by releasing a PCS market forecast study. Telocator estimated that if the Commission licensed PCS by 1994, there could be a total of 23 million subscribers attained within three years.<sup>55</sup> Potential subscribers were listed in three categories: Telepoint

*communications Services* (Gen. Dkt. 90-314), FCC News, Oct. 8, 1992.

<sup>53</sup> See *Emerging Technology Order*, *supra* note 48, Separate Statement of Commissioner Andrew C. Barrett; see also *Telocator Demand Study Shows PCS Licensing by 1994 Could Bring 23 Million Subscribers Within Three Years*, TELELOCATOR NEWS RELEASE, May 20, 1992 [hereinafter PCS NEWS RELEASE].

<sup>54</sup> See *PCS NPRM*, *supra* note 1, para. 23.

<sup>55</sup> See *MARKETING AND CONSUMER AFFAIRS COMMITTEE TELELOCATOR PCS SECTION, PCS DEMAND FORECAST*, May 1, 1992 [hereinafter *PCS DEMAND FORECAST*]; see also *PCS NEWS RELEASE*, *supra* note 53; *Emerging Technology Order*, *supra* note 48, Separate Statement of Commissioner Andrew C. Barrett.

(5.6 million), Personal Telecommunications Services (9.4 million) and Wireless PBX (8.25 million).<sup>56</sup> Telocator further estimated that the PCS services could grow to 56 million subscribers by 2002.<sup>57</sup> The study also predicted that competitive services such as paging, cellular and SMR could grow from a current combined base of approximately 21 million to 62 million subscribers during the same period.<sup>58</sup> However, if the licensing of PCS was delayed until 1997 the study estimated that approximately 10 million PCS subscribers could be lost by the year 2002.<sup>59</sup> Under that scenario, competing services would gain an additional 6 million subscribers, for a total of 68 million subscribers by 2002.<sup>60</sup> Thus, the estimated net loss for mobile services due to a delay in licensing PCS could be approximately 4 million subscribers.<sup>61</sup>

The entire cellular service market today constitutes approximately 9 million subscribers.<sup>62</sup> Thus, a loss of 10 million subscribers in a broadly defined PCS market, or a net loss of 4 million subscribers to mobile services, is not an insignificant number. The economic activity surrounding a loss of several million subscribers involves equipment manufacturers and various service providers.

American companies are in a position to provide the new services that PCS may offer. By the end of the decade, PCS is estimated to be a \$50 billion industry, serving as many as 150 million people worldwide and 60 million people in the U.S.<sup>63</sup> Given the potential size of the market, the FCC must continue to engage in efforts to develop PCS services in the United States. In doing so, the Commission must

critically examine any transition period that may unduly delay the introduction of new PCS.<sup>64</sup> The process must be logical, systematic and able to accommodate the concerns of fixed users wherever possible.

## B. The Potential Impact of Relocation

Private and common carrier fixed microwave services currently use the 220 MHz of spectrum that the Commission has reallocated to emerging technologies.<sup>65</sup> Consequently, another issue is how to accommodate these incumbent fixed microwave users in the least disruptive manner. Several solutions have been proposed.

First, PCS proponents and fixed microwave user groups, together with the FCC staff, have participated in discussions to identify transitional problems. This dialogue will continue as the FCC formulates PCS licensing rules and defines the transition period for the relocation of fixed microwave licensees.

Second, the Commission has proposed market-based incentives for accommodating the spectrum needs of fixed microwave users. Based on the initial record, it appears that PCS proponents could use market-based incentives, such as tax certificates, to compensate and relocate fixed users where possible.<sup>66</sup>

Third, the Commission has taken steps to provide fixed users at 2 GHz with the technical ability to relocate to bands above 3 GHz.<sup>67</sup> Subsequent to the *Emerging Technology Order*, the Commission adopted the *Further Notice* to reallocate and rechannelize several bands above 3 GHz (i.e., 4, 6, 10, and 11 GHz bands).<sup>68</sup> This development is important be-

<sup>56</sup> PCS DEMAND FORECAST, *supra* note 55; see also PCS NEWS RELEASE, *supra* note 53.

<sup>57</sup> See PCS NEWS RELEASE, *supra* note 53.

<sup>58</sup> *Id.*

<sup>59</sup> *Id.*

<sup>60</sup> *Id.*; see also DONALDSON, LUFKIN & JENRETTE, THE CELLULAR COMMUNICATIONS INDUSTRY, Spring 1992, at 14-15 [hereinafter DLJ 1992 FORECAST]. This study projected a cellular services market of approximately 39.6 million subscribers by the year 2000, and a faster growth model of approximately 64.75 million subscribers by the year 2000, if a PCS type service was included and began operating by 1994 at much lower prices. Under the faster growth model, new customers might only be spending \$20-30 per month for mobile services. Also, the DLJ 1992 FORECAST assumed that initial PCS offerings would come from cellular companies in the early phases of the service. New competitors probably would not come on line before 1995, assuming PCS was a licensed service by 1994. See *id.* at 15.

<sup>61</sup> See PCS DEMAND FORECAST, *supra* note 55; see also PCS NEWS RELEASE, *supra* note 53.

<sup>62</sup> See DONALDSON, *supra* note 6, at 11; see also *Cellular*

*Phones Go National for Service*, WASH. TIMES, Feb. 19, 1993, at B3.

<sup>63</sup> Kurt A. Wimmer, *Global Development of Personal Communications Services*, COMM. LAW., Summer 1992, at 7.

<sup>64</sup> See *Emerging Technology Order*, *supra* note 48.

<sup>65</sup> See PCS NPRM, *supra* note 1; see also *Further Notice*, *supra* note 47, para. 3.

<sup>66</sup> See *Emerging Technology Order*, *supra* note 48, para. 37. Several parties have suggested that tax certificates would provide a strong incentive to relocate fixed users, including Alcatel, American Personal Communications, Baltimore Gas and Electric, CTIA, Centerior Energy Corporation, COMSEARCH, Edison Electric Institute, GTE Services, NYNEX Mobile, OPASTCO, Rochester Telephone Association, Southern Natural Gas, Telocator, Southwestern Bell, US WEST, Vanguard Cellular, and Williams Natural Gas. Tax certificates would be used by fixed microwave incumbents to defer any capital gain derived from compensation for relocation. *Id.* Separate Statement of Commissioner Andrew C. Barrett, at 2 n.4.

<sup>67</sup> See *Emerging Technology Order*, *supra* note 48.

<sup>68</sup> See *Further Notice*, *supra* note 47.

cause it will facilitate clearer spectrum band opportunities at 2 GHz for PCS licensees without the present requirement to share spectrum with a number of incumbent fixed microwave users.<sup>69</sup> In this regard, it should be noted that the National Telecommunications and Information Administration ("NTIA") submitted a study in August 1992, which concluded that fixed microwave links at 6 GHz could be engineered to be as effective as the present 2 GHz links, except in certain coastal areas.<sup>70</sup> NTIA estimated however, that two percent of the present 30,000 fixed microwave commercial users would have technical difficulty relocating to bands above 3 GHz.<sup>71</sup>

Fourth, NTIA and the FCC have been exploring the possibility of relocating some fixed users to a government spectrum band at 1710-1850 MHz. NTIA has found that this government band could accommodate a limited number of commercial users, particularly in the top fifty metropolitan statistical areas.<sup>72</sup> Thus, based on that study, it appears that this government band could not reaccommodate most of the 2 GHz fixed microwave users. The Commission and NTIA will continue to examine this issue.

Finally, Congress has been active in this area. Both the House and Senate have engaged in extensive discussion on the issue and have indicated support in response to the *Emerging Technology Order*.<sup>73</sup> It is imperative that Congress continue to support FCC efforts to authorize emerging technologies. In its ongoing dialogue with Congress, the FCC must focus on two general policy concerns: (1) the economic impact of any delay in starting PCS or other new services past 1995; and (2) the economic and public safety impact of the transition to new PCS services by 1995, while reaccommodating fixed microwave users as proposed.<sup>74</sup>

### III. OTHER REGULATORY ISSUES: PCS LICENSING AND SERVICE

In addition to the issues raised by spectrum reallocation in the *Emerging Technology Docket*, the Commission must address a variety of other issues

with regard to PCS service and licensing rules. In the *PCS NPRM*, the Commission addressed PCS service and licensing issues for broadband PCS service in the 2 GHz band and narrowband PCS service in the 900 MHz band. The Commission indicated that it would stress four values in providing spectrum and establishing a structure for PCS: (1) competition in the delivery of services; (2) speed of deployment; (3) universality of services; and (4) diversity of services.<sup>75</sup> While all of those values are important, the issues of competition and diversity should take priority. As a result, two major regulatory concerns in the PCS Docket are how the FCC should define market size and determine the appropriate number of competitors that it should license in each market. Other issues include: (1) eligibility requirements for PCS licensees; (2) the use of lotteries versus auctions to license the PCS services; (3) pioneer preference selection; (4) potential state and federal jurisdictional issues with respect to the regulation of PCS; (5) technical interference standards and (6) the accommodation of PCS services in the North American Numbering Plan.

#### A. Market Size

With respect to market size, the *PCS NPRM* presents a range of options, including: 487 "Basic Rand McNally Trading Areas" plus Puerto Rico; 47 "Major Trading Areas" plus Alaska and Puerto Rico; 194 telephone LATAS; and nationwide license areas.<sup>76</sup> All of these proposals are larger than the current 734 Metropolitan Statistical Area/Rural Service Area ("MSA/RSA") markets established for cellular service.<sup>77</sup>

In determining the appropriate market size for PCS services, the Commission should focus on structures that will encourage greater competition in the telecommunications industry. In addition, the Commission must remain aware of the impact of its market size definitions on the ability to attract the investment capital necessary for the launch of various PCS services. A PCS framework which includes a signifi-

<sup>69</sup> *Id.*

<sup>70</sup> See Gerald F. Hurt & Philip E. Gawthrop, *Feasibility of Relocating Non-Government Fixed Systems into the 1710-1850 MHz Band*, U.S. DEPT. OF COM. NTIA REP. 92-286 (Aug. 1992) [hereinafter NTIA REP.]; see also *Emerging Technology Order*, *supra* note 48, paras. 35-36.

<sup>71</sup> NTIA REP., *supra* note 70.

<sup>72</sup> *Id.*; see also *Further Notice*, *supra* note 47, paras. 22-24.

<sup>73</sup> See *FCC Allocates 2 GHz Band to Emerging Technologies, Adopts 'Further Notice' Proposing Transitional Frame-*

*work to Accommodate Incumbent Private Fixed Microwave Licensees*, TELECOMM. REP., Sept. 21, 1992, at 12-13.

<sup>74</sup> See Remarks by Commissioner Andrew C. Barrett, Federal Communications Bar Association/Telocator Personal Communications Services Seminar, Washington, D.C. (Sept. 9, 1992) (on file at the FCC, Washington, D.C.).

<sup>75</sup> *PCS NPRM*, *supra* note 1, para. 6.

<sup>76</sup> *Id.* paras. 56-61.

<sup>77</sup> *Id.* para. 56.

cant mix of regional and local market sizes is likely to encourage greater competition. Regional and local market sizes could provide opportunities for new entrants (i.e., cable and new ventures), as well as existing cellular and local exchange carriers ("LEC")<sup>78</sup> to compete for PCS licenses across the country.<sup>79</sup>

Certain parties are filing comments in the record to indicate their support for a mix of smaller PCS service areas. Some commenters have introduced variations to the FCC's proposals for "Basic Trading Areas."<sup>80</sup> Other commenters, such as MCI, proposed nationwide areas. Market size will be a significant factor in determining how to implement the PCS framework. The Commission must focus on its policy priorities in order to resolve this matter.

## B. Licensing

Nationwide licensing in PCS is not a preferred option based on the initial round of comments in the record.<sup>81</sup> Unlike satellite consortiums or other services that have high fixed costs to build new plants, existing cable, cellular, LEC and microwave services (i.e., wireless cable) offer sufficient infrastructure to leverage their plants and offer PCS-type services. Moreover, the FCC's broad definition of PCS as a family of mobile and portable radio communications services could result in a number of new entrants who seek to fill specially tailored local market niches (i.e., paging, mobile wireless data or video or facsimile) or more localized market niches for basic services. Thus, the argument that one or two nationwide licensees must control this service is not convincing. While national interconnectivity for wireless services may become important at some

point, it should not necessarily be the dominant theme in the initial debate on PCS licensing schemes. Allowing a few large entities to dominate PCS through nationwide licenses could prove anti-competitive and counterproductive to the Commission's efforts to promote local competition in the PCS market.<sup>82</sup> There is a significant burden on proponents of nationwide PCS licenses to prove that substantial competitive benefits will occur under such a licensing scheme.

A licensing framework that promotes local competition offers several benefits. Local service areas promote speed in development of services, particularly in smaller cities and rural towns. Local service areas also promote the development of multiple PCS licenses, thus offering consumers a choice among various service providers.

Regarding the number of competitors permitted in each market, it appears that multiple PCS licenses would be optimal.<sup>83</sup> One major policy concern is that new entrants, such as cable operators and other entities interested in PCS, receive an opportunity to compete for licenses in markets across the country. Since the *PCS NPRM* has not precluded the eligibility of existing cellular companies or the LECs, it appears that three or more PCS service providers per market is best, assuming new entrants as well as existing cellular and LEC companies are included in the mix.<sup>84</sup>

In assessing the appropriate number of competitors to license in each market, the FCC must remain aware of the United Kingdom's ("U.K.") difficult experience in launching CT-2 telepoint services.<sup>85</sup> Companies in the U.K. experienced problems in launching CT-2 services because too little spectrum

<sup>78</sup> A LEC is a local exchange phone company that provides phone service in a designated local market area (i.e., C&P Telephone).

<sup>79</sup> See *PCS NPRM*, *supra* note 1, paras. 63, 71.

<sup>80</sup> See *PCS Comments*, *supra* note 32. The following commenters advocated the use of MSAs/RSAs for PCS: BellSouth, McCaw, NTCA, Telocator, Department of Justice, USTA and US West. CELSAT, Inc., MCI, PCN America and Interdigital Communications Corp. advocated the use of national licensing areas for PCS. Those parties supporting the use of Major Trading Areas were: APC, Cox Enterprises, US West, Time Warner and UTC. Ameritech and PacTel proposed Basic Trading Areas. AT&T and UTC suggested the use of LATAs for PCS service areas. See WILEY, REIN & FIELDING, SUMMARY OF OPENING COMMENTS ON NOTICE OF PROPOSED RULEMAKING ON PERSONAL COMMUNICATIONS SERVICES, Gen Dkt. 90-314, ET Dkt. 92-100, (Nov. 16, 1992). CTIA proposed the use of existing cellular MSA/RSA licensing areas rather than creating new license areas as proposed in FCC's Notice of Proposed Rulemaking. See *id.* Summary of CTIA's *PCS Comments*.

<sup>81</sup> See *PCS Comments*, *supra* note 32. Only four parties supported nationwide service areas. In contrast, the great majority of the parties advocated the use of MSAs/RSAs, while the remaining parties suggested the use of MTAs, LATAs, BTAs, or some combination of those service areas. See also WILEY, REIN & FIELDING, MATRICES OF OPENING COMMENTERS' POSITIONS, NOTICE OF PROPOSED RULEMAKING ON PERSONAL COMMUNICATIONS SERVICES, Gen Dkt. 90-314, ET Dkt. 92-100 (Nov. 20, 1992).

<sup>82</sup> See *PCS NPRM*, *supra* note 1.

<sup>83</sup> See *id.* para. 81.

<sup>84</sup> Spectrum allocation decisions with respect to market size and channelization will impact the number of competitors allowed into a single PCS market. See generally FCC, OPP WORKING PAPER No. 28., PUTTING IT ALL TOGETHER: THE COST STRUCTURE OF PERSONAL COMMUNICATIONS SERVICES, (Nov. 1992) (authored by David P. Reed); see also *PCS Comments*, *supra* note 32.

<sup>85</sup> See Wimmer, *supra* note 63.



in the 864-868 MHz band was divided among too many licensees.<sup>86</sup> CT-2 was also designated as a narrower one-way communications service, and thus the U.K. service did not offer the two-way flexibility contemplated by U.S. PCS proponents.<sup>87</sup> The Commission should analyze all of those factors as it proceeds to license PCS in the U.S.

The Commission can avoid the problems encountered in the U.K. CT-2 licensing process by developing an appropriate mix of market sizes and allocating sufficient spectrum to each PCS license. In the *PCS NPRM*, the Commission proposes a variety of options in that regard. In addition to contemplating a mix of local and regional market sizes, the Commission also proposed spectrum blocks of 20-40 MHz per licensee, depending on the total number of licensees.<sup>88</sup> Further, 20 MHz was suggested for unlicensed PCS operations (i.e., data services) and 10 MHz for LEC local wireless loop operations.<sup>89</sup> Clearly, sufficient spectrum must be allocated in the licensing schemes in order to promote a flexible framework for competitive PCS services.

### C. Eligibility

The *PCS NPRM* did not exclude anyone from applying for PCS licenses. One of the Commission's major policy goals is to promote additional competition for communications services through PCS. Thus, a significant issue raised in this docket is whether the Commission should preclude LECs or cellular operators from eligibility for PCS licenses, particularly in their present service areas. To resolve the issue of eligibility, the Commission must balance potential anti-competitive concerns caused by LEC and cellular participation, with an analysis of the potential benefits (e.g., technical service enhancements and infrastructure leverage) those entities could provide.<sup>90</sup>

Cellular companies could provide several benefits to the launch of PCS services. Various cellular companies are currently exploring the uses of microcell

digital technologies and spectrum efficient overlay schemes. Several reports indicate that certain spectrum schemes and microcell applications could expand current cellular capacity up to two and one half times, and provide personalized mobile services in any environment, both in-building and outside.<sup>91</sup> These technological developments can help inform the FCC's efforts with technical standards in the PCS area. Cellular companies also have operational expertise in deploying wireless, multi-cell networks. Thus, the FCC cannot ignore the benefits of their technical and operational expertise as the PCS eligibility issue is resolved.

Cellular participation in PCS also raises potential anti-competitive concerns, particularly if cellular operators can obtain PCS licenses in their current cellular franchise areas. The Commission must conduct a careful review of the potential anti-competitive impact that cellular companies could have on the development of 2 GHz PCS services, especially within their existing cellular franchise areas.<sup>92</sup>

With respect to LEC involvement in PCS, the Commission should weigh the advantages of LEC entry against the potential disadvantages.<sup>93</sup> The local LEC wireline phone network could be used to provide integrated, wireless local loop services. The Commission must assess the competitive impact of allowing LECs to acquire spectrum for wireless PCS services as part of their local phone network. Comments on the proposal to eliminate the present Bell Operating Company/cellular<sup>94</sup> separate subsidiary requirement should provide insight into this subject.

### D. Licensing Scheme

Now that the Commission has allocated a portion of the 2 GHz band to PCS, it must decide how to issue these licenses. In the *PCS NPRM* the Commission proposed a ten year license term with a renewal expectancy similar to that provided to cellular licenses.<sup>95</sup> Utilizing an improved lottery process was also suggested.<sup>96</sup> An improved lottery process would

<sup>86</sup> *Id.*

<sup>87</sup> *Id.*

<sup>88</sup> See *PCS NPRM*, *supra* note 1; see also Wimmer, *supra* note 63.

<sup>89</sup> *PCS NPRM*, *supra* note 1, paras. 41, 71.

<sup>90</sup> See *id.* paras. 63-80.

<sup>91</sup> See generally Chris Demarche, Director of Advanced Technology, Pactel Corporation, Address at Telestrategies Conference (July 28, 1992); see also Stephen Sullivan et al., *Growing the Wireless Segment*, *CELLULAR BUS.*, Dec. 1991, at 25; William C. Y. Lee, *An Innovative Microcell System*, *CELLULAR*

*Bus.*, Dec. 1991, at 42, 44.

<sup>92</sup> See *PCS NPRM*, *supra* note 1, para. 63.

<sup>93</sup> *Id.* para. 71.

<sup>94</sup> Bell Operating Companies ("BOC") are the holding companies for seven major local exchange areas (i.e., Bell Atlantic, Bell South). Those entities are required to operate their cellular franchises separate from their local wireline phone companies. Thus, BOC cellular franchises are operated in separate subsidiaries.

<sup>95</sup> See *PCS NPRM*, *supra* note 1, para. 83.

<sup>96</sup> See *id.* paras. 84-90.

offer a means for legitimate new entrants to become involved in the PCS service. In the alternative, the Commission seeks comment on the competitive bidding process ("auctions"), a scheme not currently authorized by Congress.<sup>97</sup> Because it is uncertain how a competitive bidding process would work, particularly with respect to smaller entities who seek to participate, the FCC should analyze the comments from this perspective. Given the differing views on the merits of auctions versus lotteries in distributing FCC licenses, these issues will create significant debate as the PCS Docket evolves.<sup>98</sup>

#### E. Pioneer Preference Selection

With over 100 companies conducting over 150 experiments on PCS, the enthusiastic investment toward PCS services has been encouraging.<sup>99</sup> As a result of the initial experimental efforts, in October 1992, the FCC tentatively awarded pioneer preferences for the PCS 2 GHz band to Cox Enterprises ("Cox"), American Personal Communications ("APC"), and Omnipoint Communications ("Omnipoint").<sup>100</sup> The Commission selected these three proponents from the ninety-six pioneer preference requests filed for 2 GHz PCS services. While the decision is only tentative, its implications should not be ignored. None of these players represent traditional telephone or local exchange companies, but rather are companies seeking to become new players in the market for wireless PCS services.<sup>101</sup>

The Commission's pioneer preference rules are intended to provide genuine innovators with the opportunity to avoid the delays and risks of the FCC's licensing process (i.e., lottery or comparative hearings). In evaluating pioneer preference requests,

the Commission generally looks to see whether: (1) the license applicant can show it will provide a new service or enhance significantly an existing service; (2) final regulations adopted for the new or existing service are a logical outgrowth of the pioneer preference proposal; and (3) the licensing scheme allows the grant of a pioneer preference without precluding other competitive entrants.<sup>102</sup> The specific criteria considered in reviewing the merits of a pioneer preference request are: (1) original improvement in existing service technologies; (2) significant added functionality; (3) significant change in the operating or technical characteristics of a service; (4) greater spectrum efficiency or quality of information transfer; (5) proposed spectrum sharing; and (6) significant reduction in costs to the public.<sup>103</sup>

Applying these requirements to the PCS pioneer preference docket, the Commission tentatively awarded a pioneer preference to American Personal Communications for the development of spectrum sharing techniques at 2 GHz.<sup>104</sup> APC worked on the development of a Frequency Agile Sharing Technology ("FAST") that could facilitate sharing between fixed microwave and PCS operations in the 2 GHz band.<sup>105</sup> The Commission also tentatively awarded a pioneer preference to Cox Enterprises for its demonstration of technology that integrates cable television plant with PCS microcells. Cox developed equipment that interfaces PCS microcells with copper, fiber, and coaxial cable plant.<sup>106</sup> Finally, the Commission awarded Omnipoint Communications a pioneer preference for developing equipment that allows PCS operations in the 2 GHz band. Omnipoint focused on radio frequency engineering and related spread spectrum product design, development and

<sup>97</sup> *Id.* paras. 91-92.

<sup>98</sup> See generally Charles F. Mason, *PCS Remains Political Hot Potato*, TELEPHONY, Sept. 14, 1992, at 9. It should be noted that President Clinton's Administration proposed that the FCC be granted auction authority for spectrum licensing. Congressional communication subcommittees are also reviewing the merits of such authorizing legislation.

<sup>99</sup> In August 1992, GTE announced the largest PCS consumer trial market among residential users and small businesses in Western Florida. It is attempting to determine different market demands for various types of mobile and portable services. It also will explore the pros and cons of using various types of network infrastructures, from the local phone and cable companies to the local cellular networks. See *PCS Trial Seeking to Determine What Market Will Bear for PCS*, COMM. DAILY, Aug. 26, 1992, at 1; see also *PCS Testing Planned*, BROADCASTING'S TV FAX, Oct. 9, 1992 (announcing both Cablevision Systems Corporation's and Associated PCN Company's PCS test plans,

which they say will demonstrate interference-free spectrum sharing in the proposed bands).

<sup>100</sup> See *Pioneer Preference Order*, *supra* note 51.

<sup>101</sup> See Remarks by Byron F. Marchant before the National Association of Regulatory Utility Commissions (Nov. 18, 1992) [hereinafter Marchant] (transcript available at the FCC, Washington, D.C.).

<sup>102</sup> *Action in Docket Case-FCC Tentatively Awards Pioneer's Preferences to Three Applicants for New Personal Communications Services* (Gen. Dkt. 90-314), FCC News, Oct. 8, 1992.

<sup>103</sup> See *In re Establishment of Procedures to Provide a Preference to Applicants Proposing an Allocation for New Services, Report and Order*, 6 FCC Rcd. 3488, para. 48 (1991).

<sup>104</sup> See *Pioneer Preference Order*, *supra* note 51, paras. 7-11.

<sup>105</sup> *Id.*

<sup>106</sup> *Id.* paras. 12-18.

deployment of equipment.<sup>107</sup> Before these decisions become final, the public has an opportunity to comment on those selections.

Although the Commission voted unanimously to award those tentative PCS preferences, concerns have been raised about the fairness of the pioneer preference selection process.<sup>108</sup> Particularly, certain comments indicate frustration caused by the Commission's decision not to grant a greater number of pioneer preferences to competing applicants. In that regard, the FCC must balance the policy goals of granting pioneer preferences to spur innovations with the need to implement adequate criteria when evaluating pioneer preference requests in each docket.<sup>109</sup> Where there are a significant number of pioneer preference applications, as in the PCS Docket, and where the distinctions are not as clear between various applicants who have conducted extensive experiments, the FCC's process of review should be specifically tailored to each docket.

Given the distinctions in technologies and service formats between various emerging technology dockets, it is unlikely that one case will serve as a complete precedent for a subsequent case in the pioneer preference area. Where completely different factors are involved in each docket, it may be necessary for the Commission to develop more specific technical review criteria before making each tentative decision in that docket. The Commission has emphasized the preliminary nature of tentative pioneer preference decisions, and will continue to review public comment on the action.

#### F. Private Versus Common Carriage: Federal Preemption

Several critical questions are raised by the issue of private versus common carriage in the *PCS NPRM*.<sup>110</sup> With respect to private carriage regulation, the FCC must address three issues. First, if PCS is regulated as a private carrier, no resale of interconnected telephone service for profit is permitted. Second, foreign ownership is not restricted under section 310(b) on private radio services. Thus, eligible PCS entrants could include any number of for-

eign entities, including foreign communications carriers or manufacturers. Finally, federal rules for private carriers would preempt state and local entry and rate regulation.

If a PCS carrier is regulated as a nondominant common carrier, it may be subject to streamlined tariff regulation at the federal level.<sup>111</sup> In that case, federal rules would not preempt state and local regulation. The critical issues will be whether the FCC's defined PCS markets allow the intrastate components of PCS to be severed technically or otherwise from the interstate components, or whether state or local regulation of intrastate components would thwart federal policy underlying PCS service. If various state jurisdictions regulate PCS in a number of different ways, additional barriers to entry could evolve. Clearly, the Commission will need to resolve the subject of federal-state jurisdiction in the PCS Docket. Of particular interest with respect to the federal preemption question is the potential effect of LEC entry into PCS.<sup>112</sup> Jurisdictional issues must be handled carefully in order to avoid unnecessary fragmentation of the PCS regulatory scheme.

#### G. Standards

If multiple PCS operators are in a mix of regional and local markets, then technical interference standards will be important.<sup>113</sup> The ability to roam, interconnect and switch PCS traffic between wireline and wireless networks presents significant technical challenges. To the extent regulators move toward a competitive entry model, the quality of service will be effected by the Commission's ability to develop a reasonable set of technical standards. While the FCC endeavors to allow PCS proponents to provide any number of services with the technology they choose, it must ensure there is a baseline of interference standards that do not permit multiple competitors to degrade the quality of PCS services.<sup>114</sup>

#### H. North American Numbering Plan

The FCC has initiated a *Notice of Inquiry* to ex-

<sup>107</sup> *Id.* paras. 19-22.

<sup>108</sup> See *Pioneer Preference Order*, *supra* note 51, Separate Statement of Commissioner Andrew C. Barrett.

<sup>109</sup> See Amendment of Section 2.106 of the Commission's Rules to Allocate the 1610-1626.5 MHz and 2483-2500 MHz Bands for Use by the Mobile-Satellite Service, ET Dkt. No. 92-28, Separate Statement of Commissioner Andrew C. Barrett (Aug. 5, 1992) (transcript on file at the FCC, Washington,

D.C.).

<sup>110</sup> See *PCS NPRM*, *supra* note 1, paras. 94-98.

<sup>111</sup> See generally *FCC Proposes to Streamline Tariff Regulation of Nondominant Carriers 'To the Maximum Extent Possible' Under Law*, TELECOMM. REP., Feb 22, 1993, at 28-29.

<sup>112</sup> See Marchant, *supra* note 101, at 5.

<sup>113</sup> See *PCS NPRM*, *supra* note 1, paras. 104-08.

<sup>114</sup> *Id.*

plore various issues related to the future administration of the North American Numbering Plan.<sup>115</sup> Clearly, if a truly portable PCS service is to exist, a database must support number portability among multiple PCS vendors and service areas. The issue is already becoming important in the cellular service market. As PCS evolves, a comprehensive numbering plan will become even more critical to the future success of the family of wireless, portable services. Furthermore, once low-earth orbit satellite services become a reality in the U.S., additional vendors will be offering portable communications services. The future numbering plan must account for those developments.<sup>116</sup>

#### IV. LOOKING AHEAD

PCS presents dynamic issues in many complicated areas. PCS also presents an opportunity for a major revolution in communications services. Alliances between computer companies, phone service providers and wireless data companies are likely to become more commonplace. Such activity can already be seen from AT&T, IBM, Motorola, Bell Atlantic, Bell South, McCaw and other companies. The future wireless data market is estimated to be worth several billion dollars.<sup>117</sup> Further, the global market for PCS services offers potential economic growth for

many companies in the communications business. Given those realities, the Commission must provide U.S. companies with the opportunity to compete and become international leaders in the PCS service and equipment market. The Commission must also ensure that small businesses and new entrants have an opportunity to compete for PCS licenses.

As we proceed to the new paradigm of a network of networks, and develop the future framework for competitive entry regulation, it is inevitable that regulators will continue to face tough issues. Transitional periods always create uncertainty accompanied with conflicting views. However, if those matters are addressed in a methodical and forthright manner, the issues can be resolved. Unlike the period during the late 1970s and early 1980s, this country and the economy cannot afford additional, undue delays in offering new communications services.<sup>118</sup>

Wireless services are evolving in Europe, Asia and South America. Other parts of the world are examining the potential effectiveness of integrating wireless services into their telecommunications infrastructure.<sup>119</sup> PCS presents challenges and opportunities for legislators, regulators and policy makers to work together to develop a new regulatory scheme for the remainder of the decade and into the twenty-first century.

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<sup>115</sup> See *In re Administration of the North American Numbering Plan, Notice of Inquiry*, 7 FCC Rcd. 6837 (1992).

<sup>116</sup> See Marchant, *supra* note 101, at 6; see also *FCC Issues Notice Of Inquiry on Bellcore's North American Numbering Plan; Commission Questions Whether Another Organization Should Administer Plan*, *TELOCATOR BULL.*, Oct. 23, 1992, at 5-6.

<sup>117</sup> See generally DONALDSON, LUFKIN & JENRETTE, *THE*

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CELLULAR COMMUNICATIONS INDUSTRY, Winter 1991-1992.

<sup>118</sup> See Marchant, *supra* note 101, at 6; see also *Technology for America's Economic Growth, A New Direction to Build Economic Strength*, Report by President William J. Clinton and Vice President Albert Gore, Jr., Feb. 22, 1993.

<sup>119</sup> See *Wireless Loops Take Hold in Eastern Europe*, *TELEPHONY*, Oct. 19, 1992, at 9; see also Wimmer, *supra* note 63.