of "relegating the existing local service providers to technical, service, and market obsolescence" (NTI, p. 31). The benefits of LEC participation outweigh any speculative dangers, which can be addressed by safeguards.

III. LICENSING ISSUES

A. Three Licenses Should Be Awarded In Each Area

1. Many Commenters Support Three Licenses

Over twenty commenters supported an award of three PCS licenses. These commenters covered a broad spectrum--IECs (Sprint, MCI); the California Public Utilities Commission; the DOJ; manufacturers (NTI, Rolm, and Interdigital); and many others. As we stated in our Comments at 18-20, three licensees will provide ample competition, can be given sufficient spectrum, and will be economically viable.

2. More Than Three Licenses Should Not Be Awarded

Most of those who advocate four or more PCS licenses have not submitted any reasons, other than vague statements about the need for competition, in support of their position. Telesis and many others have shown, however, that there will be ample competition with three licenses per market, since PCS will compete with the existing cellular licensees and with SMR. (See Hausman Affidavit at 4-6.)

In contrast to other commenters, the OPP Paper makes an extensive argument, employing sophisticated economic modeling, in support of six licensees. We show below that the OPP Paper's model appears valid, but includes a few erroneous

assumptions; and therefore its conclusion favoring up to six licensees is invalid.

The OPP Paper concludes that the cost function of PCS does not justify limiting the number of licenses in the PCS market. The paper analyzes the point at which economies of scale can be achieved in a PCS market with anywhere from one to six providers, and concludes that the cost differential between a sole provider and six providers is not significant. The OPP Paper's conclusions on PCS economies of scale, i.e., production or marketing efficiencies that lead to a decline in long-run average costs, were based upon critical assumptions about system cost and market penetration which are not supported by our own experiences and studies.[7]

With regard to PCS system costs, system usage (i.e., Erlangs per subscriber) is a significant factor in determining when additional cells for capacity as opposed to coverage are required. OPP's assumption of .03 Erlangs per subscriber at busy hour is a very aggressive assumption, leading to a much more rapid exhaustion of scale economies than we believe likely. By way of comparison, cellular systems use 0.009 Erlangs per subscriber. If PCS rates are lower than current cellular rates, it is expected that holding times will increase, perhaps more than double the cellular time. On the other hand, cellular providers have captured many early-adopter

[7]As discussed above, Section II.A.1., Telesis agrees with the study's analysis and finding regarding economies of scope between PCS and other telecommunications systems.

heavy users, which would indicate that .03 Erlangs per subscriber is an unrealistically high figure. The net effect of this is that a higher penetration rate will be needed before system capacity is reached and fixed costs are recovered.

On the operating cost side, the OPP Paper includes only advertising and customer service in its sales and marketing expenses, excluding any distribution channel commissions. Mr. Reed states that such commissions are part of a pricing strategy rather than a cost of service (OPP Paper at 26, fn 23). In our experience, most wireless providers use commissions to attract new subscribers and meet competition; we believe that many PCS service providers will also have to pay some sales commissions or other sales incentives as part of their overall marketing costs. By excluding commissions or referral fees, Mr. Reed understates the marketing expenses required to attract new customers, thus underestimating the annualized cost figures. As the cost is adjusted upward, the $45 average revenue per user must increase to cover the costs, resulting in fewer customers who will subscribe to the service.

The model's assumptions with regard to PCS market penetration and take-up rate are also flawed. The study states that scale economies are largely exhausted at a 10% penetration of households, which equates roughly to an 8% penetration of POPS, using the study assumption of two users per household. In order for each of six PCS carriers to achieve this penetration, 48% of the population would need to subscribe to PCS, excluding cellular. If cellular carriers were included to

total eight providers, a 64% penetration would have to be reached, which is higher than today's wireline penetration of population (rather than households) and is completely unsupported by any market research done to date.

Telesis Technologies Laboratory has commissioned primary market research based upon interviews with more than 1,000 consumers concerning the features and prices which would convince them to become PCS subscribers. The study found demand would reach approximately 34% market penetration (including cellular subscribers) in more than 10 years ("Wireless Market Demand" April 14, 1992, Mercer Management Consulting). This is consistent with the market research showing 20-40% demand conducted by Arthur D. Little, US West, Telocator and others.

By substituting a range of 20-40% demand in the OPP analysis, we find that PCS providers would only get "halfway" down the scale at which economies could be maximized. Thus, with six providers, consumers would never reap the full benefits of possible scale economies. The OPP Paper's Figure 20, p. 51, supports this conclusion. Figure 20 shows the cost curves for various market penetrations with one to six PCS providers. With six providers, the curve does not flatten out (i.e., show that economies are reached) until a total service penetration of nearly 50%. The curve for three providers flattens out at 30% total market penetration.

Even if the model's penetration assumption were correct, the assumption on timing of market saturation at five

years is unrealistic. A review of the penetration of roughly comparable consumer electronic products, such as VCRs, home computers, answering machines, color TVs and the like, suggests that the saturation point is beyond 10 years. Cellular is in its eighth year of existence and is considered to be about half-way to full market maturity. See The Cellular Communications Industry, Donaldson, Lufkin & Jenrette Winfer 1992 Report at 13. In the first half of 1992, cellular subscribers increased by 30% per year. Our primary and secondary market studies indicate a full market penetration of 34% of population in 12 to 15 years.

Finally, economies of scale are only one factor which should be considered in determining the optimum number of licenses per market. It is possible for a market to be profitably supplied by suboptimal scale providers, but there must be sufficient demand to attract the investment needed to build the suppliers' systems. Telesis's economic models demonstrate that, even in the largest markets, no more than three PCS systems could be sustained at market saturation. While it may not be within the Commission's purview to protect businesses from failure, a delay in creating a sustainable industry structure will not serve consumer interests.

In summary, Telesis believes that the OPP Paper makes the case for far fewer than six providers, once the economy of scale curves are adjusted to reflect the greater costs and longer adoption rates noted above. Assuming other policy goals such as diversity and competition can be achieved, the

Commission should encourage the development of PCS systems which achieve the greatest economies of scale in the shortest possible time. Three additional providers strike the best balance in assuring a diverse and competitive supply of service, while facilitating lower prices and rapid development of services.

B. National Licensing Does Not Serve The Public Interest

Of over 160 parties filing comments, only nine (Bell Atlantic, Interdigital, MCI, PCN America, Time Warner, Motorola, CELSAT, PowerSpectrum, and the National Communications System) advocated one or more nationwide licenses for PCS.[8] Yet nationwide licensing seems to have gained disproportionate attention. Its proponents make extravagant claims for benefits which are not supported by experience, by past Commission spectrum allocation and licensing policy, or indeed by common sense. For a variety of sound reasons, the Commission has traditionally eschewed nationwide licensing. It should do so here; PCS will be predominantly a local service, and local licenses (for example, the Basic Trading Areas which Telesis supports) should be awarded.

1. National Licensing Will Not Correct The Perceived Shortcomings Of The Cellular Licensing Process

The Commission suggests that "licensing larger PCS service areas at the outset may minimize unproductive

[8]dbX Corporation advocated a unique nationwide concept for travelers, "extended network PCS," but this is not a true "national license" concept.

regulatory and transaction costs and associated delay" (NPRM at Para. 58). In support of that theory, commenters note that it took nearly nine years to license all 734 cellular MSAs and RSAs. Even after the release of the NPRM, Commissioners, staff and interested parties have continued to sound the alarm to avoid repeating the alleged cellular licensing mistakes.[9] But the delays experienced in the cellular licensing process had virtually nothing to do with the MSA and RSA licensing areas chosen.[10] The delays were caused by the evolutionary process of developing application filing rules and the ingenious efforts of entrepreneurs trying to circumvent those rules for profit. A sensible process for PCS applications will obviate the cellular problems, regardless of the license areas chosen.

The Commission did not finally set requirements for cellular applicants until its March 3, 1982, Order on Reconsideration in Cellular Communications Systems, 89 F.C.C.2d 58 (1982). The Commission decided that applications should be filed and processed in descending order of market size because

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[9]See, e.g., Comments of Commissioner Sherrie Marshall, Mobile Communications Marketplace (Sept. 26, 1992).

[10]The study most often mentioned by critics of cellular licensing, Estimate of the Loss to the United States Caused by the FCC's Delay in Licensing Cellular Telecommunications, National Economic Research Associates, Inc. (Nov. 8, 1991), concludes that cellular licensing delay cost the U.S economy more than $86 billion. But the study does not attempt to calculate delay associated with the licensing process (which began in June 1982), but rather calculates the financial impact of the delay between 1958 and 1973 in adopting rules.

the record demonstrated that demand for service was greatest in the largest markets. A date was set 90 days from publication of the Order on Reconsideration in the Federal Register for applications for the 30 largest MSA (at that time, "SMSA") markets (89 F.C.C.2d at 88). The Commission also adopted "expedited hearing procedures" to assure that delays traditionally associated with the administrative hearing process would be minimized.[11] To expedite processing further, the Commission adopted a policy strongly encouraging mutually exclusive applicants to settle by forming partnerships or buying out each other's applications. At the time, the Commission had not even decided the best geographic licensing areas for non-MSA areas.[12]

By the time applications for the 30 largest markets had been filed, it became apparent that huge numbers of applications were in the offing. Coincidentally, in September 1982, the Commission received authority from Congress to use

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[11]At the time, the Commission did not have authority to conduct lotteries. Because it would be accepting applications for initial licenses, Ashbacker Radio Corp. v. FCC, 326 U.S. 327 (1945), required the Commission to use some type of comparative process.

[12]No party to the proceeding had any idea that cellular service would be as popular as it is. With hindsight, it might have been possible to select a better method of processing, but at the time the method chosen, after careful consideration of the record, appeared to meet the needs of the Commission, the prospective licensees and the public. For a good overview of spectrum licensing problems, see Remarks of Commissioner Ervin Duggan before the American Mobile Telecommunications Association (June 24, 1992).

lotteries to award cellular licenses.[13] Thereafter, the Commission initiated a proceeding to decide whether to grant all cellular licenses in markets other than the top 30 by lottery. The issue was resolved in favor of lotteries in Cellular Lottery Rulemaking, 98 F.C.C.2d 175 (1984), but processing of markets 31 - 90 and beyond had to be held in abeyance for more than a year. By this time, the "application mills" were in full flower, creating a host of problems for the Commission to resolve before granting additional MSA licenses.

While applications for the remaining MSAs were being accepted and lotteries held, the Commission in late 1985 embarked upon yet another proceeding to establish rules for licensing non-MSA areas--the RSAs. The agency concluded that proceeding in 1985 (Rural Cellular Service, 60 Rad. Reg. (P&F) 1029 (1986)) and soon thereafter began accepting applications for RSAs. The application mills were now generating literally hundreds of thousands of lottery applications, imposing a tremendous burden on the Commission's staff. Along with the hoards of applications came new and innovative efforts to skirt the Commission's rules. Dealing with the clever schemes of application mills further delayed what should have been routine processing of paper. Despite these obstacles, the Commission's staff pressed on, completing its initial licensing efforts in

[13]Communications Amendments Act of 1982, Pub. L. No. 97-259, §115, 96 Stat. 1087, 1094-95 (1982)

December 1991.[14]

Despite the application morass, the Commission was concurrently and expeditiously processing hundreds of requests for transfers and assignments of licenses to accommodate the licensees' desire to rationalize their licenses into markets which adequately and accurately reflected the areas in which customers actually desired service.[15] In some cases, these are small relatively circumscribed areas; in others, they are regional systems serving many states. The clear lesson of the process is that the Commission was wise not to try to predict and prescribe immutable licensing areas. Allowing rational business judgment to prevail in the face of impediments interposed by a complex regulatory processes served the cellular industry and the public much better. Ten years after the process began, cellular telephony is probably the greatest commercial success story in the Commission's history.

There is no credible study or evidence in this record that the pace at which cellular licenses were awarded was anything but reasonable and consonant with the pace at which customers desired service and equipment suppliers could produce switching and transmission gear and customer premises equipment

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[14]The Commission has only just completed adopting rules for licensing areas not served by the licensees in the MSAs and RSAs, Cellular Unserved Areas, 6 F.C.C. Rcd 6185 (1991), 7 F.C.C. Rcd 2449 (1992), Third Report and Order, FCC 92-472, released Nov. 4, 1992.

[15]The Commission decided to permit relatively unfettered transfers and assignments in Cellular Lottery Rulemaking, 98 F.C.C.2d at 215-17. See also, Bill Welch, 3 F.C.C. Rcd 6502 (1988).

(CPE). The delays in the process were attributable primarily to Congress's grant of lottery authority, the Commission's conversion from hearing procedures to lotteries, and the ingenuity of those who wanted to manipulate the Commission's processes. The delays were not attributable to the Commission's decision to grant some 1,470 licenses based on MSAs and RSAs, as opposed to some smaller number based on different geographic criteria.

2. The Alleged Benefits Of National Licensing Are Illusory

Proponents of national licensing make a number of specious arguments in support of these schemes. First, many advocates refer in support of their position to the fact that governments of other countries have awarded national PCS licenses (Bell Atlantic at 16). But the United States is so manifestly different from these countries in the diversity of its people and its geographic size that it is nonsensical to use these countries as models. Furthermore, all countries with national PCS licenses also have national LECs, which further demonstrates that they are not analogous to the United States. Finally, history disproves this argument; despite our lack of a national cellular license, our cellular carriers provide every feature available in other countries and have extended cellular systems to almost every part of our vast and diverse country. This success story is unrivalled.

Proponents also argue that it will be easier to achieve a single nationwide technical compatibility standard

with two or three national licenses. But it is not necessary to award nationwide licenses to promote a nationwide technical compatibility standard. The standard can be attained without bestowing a windfall on a single company to the detriment of dozens of other competent aspirants. The technical standards may be adopted by the Commission (as in cellular, 86 F.C.C.2d at 577-640), or by an industry group under the Commission's direction (as in Advanced Television Systems, GEN. Docket No. 87-268, or as in the cellular industry's current undertaking for future conversion to digital technology). As Telesis stated in its Comments (at 46-47), delay can be prevented by providing an incentive to the industry to reach agreement. We suggest that the only incentive needed is a requirement that no PCS system can be operated until certain minimum standards are set.

Leaving technical standards to a nationwide licensee, on the other hand, would severely limit choices and thus impede the evolution of technology, encourage restricted supplies of equipment, and simply reward one licensee with de facto monopoly control of radio frequency equipment and CPE. We should not put our technological "eggs" in one basket.

Furthermore, it is quite possible--even probable--that the national licensee will choose the "wrong" technology--one that looks promising now, but could be supplanted with something better in a few years. Many examples of such errors have occurred in the recent past - AT&T's decision in 1976 that digital switches would not be useful to

provide local service, for example, or the opinion of many experts that BETA technology was superior to VCR. But the national license scheme will lock us in to whatever technology the one or two national licensees select. Once the national licenses are awarded, there will be complete barriers to entry in PCS; thus, there will be absolutely no incentive for anyone to experiment or seek technological breakthroughs. The national licensees will invest in whatever technology they select; once this investment is made, they will be unwilling to change to a different technology. The analysis supporting national licenses has completely ignored these twin problems of barriers to entry and sunk costs in their rosy view of national licenses.

Proponents of national licenses inexplicably point to roaming as a "problem" that will be "solved" by national licenses. But this is clearly wrong, because a nationwide roaming standard has been developed for cellular without any national license. The wireless industry has recognized the value of roaming and PCS providers will certainly make it available to the public, simply because customers will expect this feature.

Several proponents of national licenses argue that economies of scale can be achieved by awarding such licenses (see, e.g., Bell Atlantic at 15); they provide no economic support for this position, and it is incorrect. First, the greatest economies of scale are at the equipment level, not at the service level. Even with local licenses, the market will

make certain that manufacturers achieve economies of scale, because this will lead them to offer equipment at the lowest prices to PCS operators. The manufacturers, anxious to achieve large-scale production, will push the licensees--there is no need for a national dictator. Second, the economies of scale for service providers are achieved at the local, rather than the national, level. The major costs for a PCS system - wirelines transport, handsets, and cell sites - will not be reduced if the system serves a huge geographic area. Telesis Comments at 22 and OPP Paper at 20 (summarizing capital costs).

In short, none of the proponents' arguments for national licenses are valid. Other countries' experiences are irrelevant. Standards can better be set without a national license because of the risks involved in letting one or two firms limit our technological choices. Roaming can be achieved without a national license. Economies of scale are local, not national.

3. Commission Precedents Support Local Licenses For PCS

Localism, as exemplified by the grant of licenses for relatively small geographic areas, has been the heart of the Commission's licensing policies for its entire history. The Commission has repeatedly found, first in broadcast licensing, then in cellular licensing, private and common carrier paging licensing, Specialized Mobile Radio (SMR) licensing, and elsewhere, that locally focused services better serve the public interest. The Commission has also found that smaller

service areas are consistent with the goals of Congress embodied in the Communications Act of 1934 and other legislation, particularly insofar as they facilitate broad participation in all segments of the communications industry. Broad participation fosters a number of national objectives which benefit the public, small business and the U.S. economy in general.[16] These reasons apply with equal force to PCS, and should lead to local licenses for PCS.

The only spectrum allocation proceedings in which national licenses have been found to be in the public interest are those involving satellite services, which project a footprint that cannot be contained in less extensive geographic areas,[17] and those in which a significant number of local licenses were awarded prior to--or at least concurrently with--a limited number of national licenses.[18]

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[16]See generally, National Telecommunications and Information Administration, Telecom 2000: Charting the Course for a New Century (Oct. 1988). The U.S. Government agencies with expertise in the area of competition and entry by small business both oppose national licensing. See Comments of Chief Counsel for Advocacy of the United States Small Business Administration, at 18-19; Comments of the United States Department of Justice, at 17-19. See also, Comments of NTIA at 19-22.

[17]Mobile Satellite Services, GEN. Docket No. 84-1234, Second Report and Order, 2 F.C.C. Rcd 485 (1987), rev'd and remanded, Aeronautical Radio, Inc. v. FCC, 928 F.2d 428 (D.C.Cir. 1991), Final Decision on Remand, 7 F.C.C.2d 266 (1992).

[18]900 MHz Paging Systems, 89 F.C.C.2d 1337 (1982); Specialized Mobile Radio Systems, 900 MHz Specialized Mobile Radio Systems, Notice of Proposed Rulemaking, 4 F.C.C. Rcd 8673 (1989) (proposing 200 channels of which 6 blocks of 10 channels would be reserved for regional or nationwide use); Licensing in the 220 - 222 MHz Band, 6 F.C.C. Rcd 2356 (1991) (allocating 200 narrowband channels of which 60 in 10 blocks of 5 or 10 channels are reserved for nationwide use). Those cases in which the

Some advocates of national licensing appear to use as a model--without attribution--the Commission's "network operator" approach in 900 MHz Paging Systems, 89 F.C.C.2d 1337 (1982), reconsideration, 93 F.C.C.2d 908 (1983). In 900 MHz Paging, the Commission allocated spectrum for forty new common carrier paging channels at 931 - 932 MHz. Based on record evidence of demand for regional and national service that could not be easily met by licensees of the jumble of existing frequencies at 35, 43, and 150 MHz, the Commission decided to establish one channel exclusively for nationwide use and two channels for either national or regional paging. 89 F.C.C.2d at 1346-47. On reconsideration, the Commission designated all three channels for nationwide paging and established a regulatory approach under which three firms would be licensed as network operators, or "carrier's carriers," with new or existing local licensees providing the paging signals for the network.[19]

Commission has awarded national licenses have not produced unqualified successes of the magnitude of the cellular and paging industries or local radio and television broadcasting. For example, Mobile Satellite Service is still not available, and there is only one company using a 900 MHz nationwide paging frequency.

[19]Twelve firms applied for the three frequencies, which the Commission assigned by lottery. Only one of the three, SkyTel, built its system. The other two failed to do so, and the licenses were distributed by a second lottery. Essentially, the large, regional, ad hoc private and common carrier systems deployed and expanded over the past decade have undermined the incipient demand for three nationwide systems identified in 1982.

Such a system was desirable in paging for economic reasons not applicable to the potential PCS marketplace. While the record showed considerable demand for nationwide paging service, the demand in any discrete geographic area was slight. Paging is a highly competitive, virtually unregulated, low-cost (a few dollars a month) service in which profit depends on the volume of units. It made no sense for a nationwide licensee to invest the capital to construct transmitters in every major city, not to mention in small communities, to transmit a few pages a month. It was much less expensive for an existing operator, who was part of a network, to add a new 900 MHz channel to its existing facilities.

The demand and economic characteristics of PCS will be different. PCS will compete with existing cellular, wireline telephony, SMR and other private two-way radio services; usage will be largely local. It will be advantageous for customers to take their PCS telephones when they travel, but national licensing is not necessary to achieve that goal. With the Common Air Interface that we support, and with roaming arrangements similar to those developed for cellular, travellers will be able to use PCS.

4. A National Licensing Scheme Presents Many Problems

The proposed national licensing schemes are flawed in many ways. First, they would preclude participation by many qualified firms. The fewer the number of licenses, the fewer the number of qualified firms who will receive them.

Innovation will be severely limited under a national license scheme; once the national licenses are awarded, no one else will have the ability to enter the market, and thus no one else will have any incentive to innovate.

The advocates of national licensing either ignore this dimension of the marketplace or attempt to mask this weakness of their proposals by describing a scenario in which hundreds of service providers will flourish under the benevolent oversight of the national licensee. Telesis submits, however, that the limit on participation is an inherent weakness in any national license proposal. Only a large number of independent local licensees, as Telesis and most others have advocated, will provide the maximum rewards for innovation and entrepreneurial risk-taking, and will create jobs and business opportunities nationwide. The Commission should encourage diversity and multiplicity of PCS providers, rather than concentration of power at the national level.

Second, PCS deployment would be slower under a nationwide scheme. It is indisputable that one company with a national license could not implement PCS service as quickly as a large number of companies with local or regional licenses. For example, AT&T's transfer of cellular operations to the seven regional companies at divestiture, along with nonwireline licenses granted to hundreds of new entrants, resulted in cellular services being available nationwide very rapidly.

If the proponents of nationwide licensing receive licenses, they will not be able to meet any deployment schedule

imposed by the Commission without subcontracting to dozens of local firms all over the country. In fact, it is in their economic interest to do so because they would then reap profits in the form of franchise fees, without committing significant amounts of their own capital. The question is whether it is in the public interest to let them profit from their valuable licenses in this manner. Telesis submits that it is not.

Moreover, most national license advocates, in their efforts to mask the inherent problems of their schemes, have simply added regulatory burdens for the Commission and competitive problems. These advocates pretend that there will be hundreds of local participants in their "consortia" (MCI and Interdigital) or "Tiers" (PCN America). But these local franchisees will mean regulatory headaches for the Commission, and will add nothing in the way of innovation. They will have no competitive alternatives to their national overlords; they will have limited economic power and flexibility.

The mixed licensing schemes, such as Bell Atlantic's proposal (2 national/3 local licenses), are even worse. The local licensees will be unable to compete with the national licensees on an equal basis. The national licensees will have a national presence and a sizable head start. It will be very difficult for them to compete effectively. Indeed, MCI recognizes that the mixture of national and local providers creates competitive difficulties and can cause problems (MCI at 11, fn 7).

5. Individual National License Proposals Are Flawed

(a) PCN America

We have shown in the previous section the major flaws of the national license scheme. Here we discuss the flaws particular to some of the individual national license proposals.

The Commission rejected a proposal in Cellular Communications Systems by Millicom, parent of PCN America, for consortium or "open entry" licensing not unlike the proposal filed by PCN America in this proceeding. See 89 F.C.C.2d at 60-64. PCN America's October 6, 1992, ex parte presentation is considerably weaker than Millicom's proposal in the Cellular case. It is little more than a laundry list of imagined benefits, devoid of supporting analysis or persuasive demonstration of its practicality. Finally, the PCN America credit card analogy is problematic. Numerous antitrust cases have been brought against Visa for its alleged attempts to restrict competition. Indeed, Visa recently lost a jury verdict in Salt Lake City in such a case (SCFC ILC Inc. d/b/a Mountain West Financial v. Visa USA, Civ. No. 91-4042 (D.C. Utah) (1992)). PCN's National Network Operator, with enormous economic power over the regional and local carriers, would raise the same concerns.

(b) Bell Atlantic

We have already commented on the problems caused by Bell Atlantic's mixture of national and local licenses. Prof. Kahn's support of this national license scheme was not

convincing; he presented no empirical support for many statements (e.g., that national licenses would result in economies of scale, Kahn at 12) and assumes his answer on many points (see para. 42). In view of the uncertainties about technology which he recognizes (para. 19), it is inconsistent for him to argue that national licenses should be awarded--as discussed above, they may choose the wrong technology, and their sunk costs will keep them from changing technologies (Kahn ignores sunk costs--see para. 16 and 35).

(c) CELSAT

CELSAT's hybrid service has no advantages over terrestrial service; in areas with low population density, it will be unnecessary, since there is plenty of cellular capacity in those areas. Because of the cost of satellites, it will be too costly to compete with terrestrial services. Like others, CELSAT wrongly asserts that economies of scale occur at the national level (p. 13). As previously noted, CELSAT recognizes the LEC cost advantage (p. 18) but does not understand that this is a reason to permit LECs to compete.

(d) PowerSpectrum

PowerSpectrum's FHMA technology is unproven and should not be the basis for the Commission's overall spectrum decision. PowerSpectrum's claim that 10 MHz is an adequate spectrum award is incorrect (see discussion infra at Section IV.B.) and contrary to almost every other commenter's position. Furthermore, such a small award will not increase efficiency, as PowerSpectrum claims (p. 4). In fact, licensees will always

have an incentive to use spectrum efficiently, to serve more customers and provide more varied services. Finally, economies of scale only exist at the local level, contrary to PowerSpectrum's assertion (p. 6).

(e) Time Warner

Time Warner's arguments about network infrastructure costs and mass market focus (pp. 3, 4) support LEC eligibility, as explained in Section II.B. Like others, Time Warner ignores the risks of the choice of the wrong technology by the single national licensee.

6. National Licenses Are Not Needed

Telesis believes that the Commission should recognize proposals for national licensing for what they are: self-serving attempts to corral valuable spectrum throughout the country. The only real appeal of nationwide licensing is that it might alleviate some licensing burdens from the Commission's staff. That is a worthy goal, but one that can be achieved in ways that better promote competition in the PCS industry. For example, use of Basic Trading Areas, as Telesis recommends, will reduce the total number of license areas from over 1400 to 487. The nearly 200 firms that have shown their interest by filing applications for experimental licenses must not be closed out of a new industry because large companies with substantial resources, such as MCI and Time Warner, would prefer to divide the PCS pie among fewer participants.

C. Lotteries Should Be Used To Award Licenses

In its opening comments, Telesis recommended that the Commission award licenses using modified lottery procedures. Telesis now supplements its lottery proposal by suggesting that the Commission include a weighing factor to give lottery preferences to applicants which have engaged in serious experimental activity under PCS experimental licenses.

The Commission has tentatively decided to award only three pioneer's preferences. Tentative Decision and Memorandum Opinion and Order, Para. 6, Nov. 6, 1992. Telesis strongly disagrees with that decision; indeed, several Commissioners expressed reservations about awarding so few preferences in view of the extensive experimental work under way. Awarding a lottery preference to those who conducted bona fide experiments is another way of recognizing the investment in time, money and resources made by Telesis and other potential applicants, if the Commission declines to award additional pioneer's preferences.

While Section 309(i) of the Communications Act of 1934 is silent regarding preferences in common carrier lotteries, the Commission has concluded that it does have discretion to award preferences. Cellular Lottery Rulemaking, 98 F.C.C.2d 175, 199-201, n.71 (1984). See also Multichannel Multipoint Distribution Service, 102 F.C.C.2d 1401 (1985), aff'd, Pappas v. FCC, 807 F.2d 1019 (D.C. Cir. 1986). The Commission decided not to award preferences in cellular lotteries, Id., but Telesis submits that preferences are more appropriate for PCS

experimental work. The Commission, in its Pioneer Preference order, noted the importance of technological innovation, and encouraged the public to make research commitments, apply for licenses, and request preferences if significant contributions were made. The Commission's invitation was accepted; those who have made substantial commitments of time and money, and have published useful material, should be given a "leg up" in the license process.

IV. SPECTRUM ISSUES

A. An Award Of 25 MHz Is Appropriate

Telesis recommends an award of 25 MHz; many commenters recommended similar awards, in the range of 20 to 30 MHz per licensee. We believe that 25 MHz of spectrum will give the PCS provider sufficient capacity to meet demand and use spectrum efficiently. An award of 25 MHz has the additional benefit of providing parity with existing cellular providers.

B. An Award Of 10 MHz Would Be Inadequate

The Commission suggested that an award of 10 MHz might permit a LEC to offer PCS (NPRM at Para. 77). Few commenters supported this suggestion. Telesis submits that 10 MHz would be inadequate. A LEC must provide a full PCS service in order to compete fairly with other PCS providers. LECs need equal spectrum in order to have parity with these other PCS providers in the areas of capacity, coverage, and cost. With less than half the spectrum awarded to others, a LEC's PCS system will necessarily have less capacity, less coverage, and higher cost

(Bell Atlantic, for example, has demonstrated the relationship between amount of spectrum and cost, Bell Atlantic at 40). Finally, the network economics of scope obtained by using LEC infrastructure will be available to all PCS licensees. There is no reason to limit spectrum for LECs. Therefore, the Commission should not give further consideration to the 10 MHz proposal.

C. Nonlicensed Users Require More Than 20 MHz

A wide range of commenters joined Telesis in recommending more than 20 MHz for various unlicensed uses (voice and data, wireless LANs, and other uses). These commenters include over 10 manufacturers, AT&T, many LECs, and several others. Some recommended as much as 80 MHz be provided for nonlicensed use; many noted that at this point in PCS development some spectrum should be reserved, to preserve flexibility and meet future needs. The number and variety of wireless nonlicensed uses proposed demonstrate conclusively that a much larger allocation of spectrum is needed than the 20 MHz proposed in NPRM. If the Commission prefers not to award as much as 65 MHz (as we proposed in our Comments at 37-39), then we suggest that some spectrum be held in reserve for future nonlicensed use.

Moreover, some non-contiguous spectrum bands should be allocated, to make possible different duplexing methods. The portion of the spectrum between 1910 and 1930 MHz (which the NPRM suggested for nonlicensed use) is suitable for Time Division Duplexing (TDD), for sending and receiving calls. But