

CREATING A PERSONAL RADIO SERVICE IN THE U.S. NAVIGATING THE STORMY REGULATORY SEAS

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1. Abstract

The Federal Communications Commission has embarked on a broad inquiry designed, ultimately, to assure the domestic availability of ubiquitous personal communications services. The administrative processes which will be followed by the FCC assure that this will be a highly charged and long term project. This paper will study the regulatory procedures which will occur in any spectrum allocation proceeding undertaken, and then review past decisions of the FCC in implementing mobile services, to consider potential approaches to the creation and regulation of any PCN services which may be authorized by the FCC at the end of its inquiry.

Introduction

Perhaps no communications-related advances conjure up more vivid images to the typical consumer than the "wireless communicator". Technology advances in the 80's have given most consumers empirical evidence of the benefits of wireless communications -- whereas "radio" communicators were once the province of police departments, truck drivers and taxi cabs, advances in paging, air-to-ground, and cellular technologies have provided many consumers with a variety of opportunities to use, and realize the substantial benefits of, communications mobility.

This mobile communications explosion domestically has been further affected by the democratization and industrialization of Eastern Europe and many of the South American countries. Societal changes in these regions have spurred increased interest in mobile communications systems, which are seen as providing the greatest potential for introducing advanced communications capabilities to societies which, even today, have only an elementary and antiquated wired telephone network.

In many respects, then, as societies become more mobile, and less oriented to particular fixed locations for particular lifestyle functions, the need to provide a low cost, user friendly, mobile means of communicating -- to cut the umbilical cord of the communications medium -- becomes even more critical to the societal advance. The pressures on technologists to develop such systems, and on the regulatory agencies -- the Federal Communications Commission ("FCC"), the National Telecommunications Industry Association ("NTIA"), and probably even Congress -- to allocate spectrum and develop the regulations necessary to encourage such technology, will be substantial.

It is virtually a given that technologists will be able to improve upon today's wireless capabilities to create better, smaller, more powerful wireless networks and systems which will continue to attract consumer interest. Indeed, the increasing demand for more communications mobility virtually assures that technology will achieve such advances. That industry today refers no longer to "cordless" communications, but rather to "tetherless" systems -- in order to further establish that no relationship will exist between a "telephone" and a particular base station -- proves how far the concepts have developed even over the last few months. However, the ability to achieve wireless advances in the United States will necessarily depend upon the availability of radio spectrum allocations and implementing regulations.

In this paper, I will explore the state of regulation in the wireless information arena in the United States. After considering the fundamental procedures which will be followed in achieving the requisite administrative actions, I will look both at the past decisions of the FCC and at its current activities in allocating spectrum and setting technical and licensing standards for mobile communications networks. I will then discuss the principal proceeding in which future decisions on wireless networks is likely to be made, the issues likely to be addressed in that proceeding, the major sectors likely to be involved in the regulatory fray, and likely timetables for decisionmaking. Taking note of the results achieved from past efforts -- and the impacts (both positive and negative) they have had on advancing the state of technology -- I will postulate and weigh the benefits of potential regulatory approaches to be followed if the United States is to achieve the regulatory environment necessary to advance, and indeed play a leading role in the development of, future wireless technologies and information networks.

Any discussion of regulation and technology in the wireless communications arena must, however, begin with a caveat. Like the state of technology, the state of regulation in this area is highly dynamic. Virtually every week a new market entrant with a new idea or approach to providing wireless communications enters the fray. The technological solutions and spectrum demands needed to satisfy each new market entrant may be quite different. Nevertheless, each of these proposals is likely to face a significant and difficult regulatory battle, first in finding the necessary radio spectrum, and then in obtaining the requisite licenses and franchises to provide the service. While technologists try to improve spectral efficiency, expand capabilities and decrease the costs of various services, the regulator must continue to balance the resulting, and often competing, demands for spectrum from the various proponents of the services and products which result from the technologists successes.

The FCC is continually faced with demands to increase the spectrum available for wireless telecommunications, at the same time that it faces demands for spectrum for new forms of mass media distribution and to meet the increased demands of existing service providers for spectrum to meet their own growth projections -- the Hobson's choice which regularly faces those who are charged with assessing competing demands for limited resources. The job of the FCC, then, is to incent both new users and old to improve spectral efficiency through technology, and ultimately to choose those technologies and services by which the maximum number of users and uses can be made of the radio spectrum for purposes that cannot be satisfied through some wired technology. And it must then reward those who have developed new technologies with the opportunity to implement them, at the same time that it creates the competitive environment in which services are likely to be presented to the consumer at the lowest cost and highest quality.

Spectrum Allocation

Because one party's use of radio spectrum has the potential for interfering with another's, the radio spectrum has long been allocated among potential users, both internationally and domestically, by the governments of the world. As a starting point, spectrum allocation is, quite logically, an international matter, since radiowaves do not stop at the border of a given nation. Under the auspices of the International Telecommunications Union ("ITU"), the nations of the world divide the use of the spectrum among three different regions -- Europe and Africa (Region 1), North and South America (Region 2) and Asia and the Pacific countries (Region 3). Having received the world's intended frequency allocation scheme -- which is regularly renegotiated at world wide and regional administrative conferences -- the FCC and the NTIA divide up the spectrum between the government and private sectors. Some spectrum is typically allocated exclusively to either side, while a limited amount of spectrum is made available on a shared basis -- primary

to one side, but also available on a secondary, non-interfering basis to the other. An Interdepartmental Radio Advisory Committee, representing the NTIA and its constituent agencies and the FCC coordinates such shared uses.

The FCC's decisions on allocating the spectrum reserved for the private sector are governed by the provisions of the Administrative Procedures Act, which require that decisions on spectrum allocation be made only after notice of an intended decision -- and an opportunity to comment -- has been given to the public. In today's highly charged, spectrum scarce environment, it is reasonably certain that any effort to create new uses of, or to reallocate, any part of the spectrum will invite substantial debate from a wide variety of interest groups intent on protecting what they have today or what they anticipate needing in the future.

There are many vehicles for presenting requests for spectrum allocations to the Commission. Often the developer of new technologies or special interest groups will file a petition for rulemaking, providing a specific proposal to the Commission for new regulations designed to effect particular uses of the spectrum. In other instances, technology breakthroughs are the result of experimental or developmental licenses issued to spectrum pioneers. When those efforts bear fruit that requires a spectrum allocation, a proceeding may be started to effect the requisite allocation. In some cases, counterproposals in one proceeding which cannot reasonably be satisfied in that case may lead to the initiation of a distinct proceeding designed to satisfy the needs of the counter-proponent.

Sometimes the Commission is faced with new ideas or developments, but the record on them is so sparse or contradictory that the FCC is not yet sure what to propose in a rulemaking notice. In those cases, it may instead initiate its consideration with a Notice of Inquiry, in which it will pose a series of questions for public comment, often about the state of technology, the potential demand for competing proposals, alternatives available for meeting those demands, and similar general questions designed to elicit broad based responses on a variety of different alternatives. And in many instances, the FCC will rely instead on the recommendations of an agency appointed "blue ribbon" panel of industry leaders from the government and private sectors which it has empaneled expressly to undertake the necessary preliminary analysis of the issues and to report to the Commission with an adequate record from which it can move the matter forward.

Whether the issues start as a petition for rulemaking, develop from the progress of an experimental license, or are the results of the work of an Advisory Committee or the comments on a Notice of Inquiry, before rules are actually adopted the Commission must issue a Notice of Proposed Rulemaking in which a specific allocation scheme or technical regulatory restructuring is proposed. After a record is developed from the public comment on that proposal -- and typically only after months (occasionally years) of further debate and analysis by the Commission and its staff to resolve the often contrary and conflicting views, new regulations and or a new spectrum allocation, will be made. Of course, those regulations will then be subject to administrative -- and usually judicial -- reconsideration for several years thereafter.

A proposal for a new spectrum allocation -- particularly one intended to satisfy the requirements of a new radio service or new technological breakthroughs -- is not likely to be adopted quickly; historically allocation proceedings will run, start to finish, closer to three years than three months. It must be remembered that the creation of the cellular service took more than a decade, from the initial request for an allocation of a cellular block to the initial acceptance of applications for licenses in the largest thirty markets. Obviously, those kinds of delays can be an unacceptably long time for a technological innovator to wait before it even gets the chance to prove out its idea. To alleviate the impact of this delay, many innovators apply for an experimental license by which they are allowed to build and operate new communications devices and systems in a controlled environment in order to prove out both the technology and the consumer acceptability and usefulness of new products.

Because most experimental licenses can be issued by the FCC's staff, the time factor associated with a grant of such license is much shorter than that needed for obtaining a license to use previously unallocated spectrum. The license will typically grant the licensee the opportunity to develop and even to operate -- on a non-interfering basis -- new technologies and or systems on as large a scale as the licensee can prove is needed to establish the viability of the new equipment or service. The FCC has recently even allowed licensees to market new services or products commercially in a controlled environment, in order to establish the demand elasticity for the proposed services. The decade long market test of the Airfone service, and many of the most recent PCN proposals, have included a "commercial" marketing component. However, as

a general rule, the Commission is loathe to allow any wide scale commercial operations of new products or services which might create substantial consumer expectations even before the new product or service has been permanently authorized spectrum allocation or rules revisions necessary to fulfill its intended scope.

Moreover, by the time decisions on a requested allocation have been made, the original innovator has often long run out of resources necessary to maintain its preeminent technological leadership position in the marketplace. In other instances, the time delay in achieving the requisite regulatory action has allowed larger, well funded organizations to join the fray. With their financial strength, they are better able to take advantage of the new rules; as a result, the innovator is denied many of the economic incentives and benefits of the "innovation". The Commission's records are filled with proposals which are adopted long after the initial proponent has either gone out of business or abandoned the initial concept -- how many remember that the current Digital Termination Services in which Motorola, Inc. recently announced the creation of a wireless PBX product (operating on a licensed basis at 18 GHz) are the outgrowth of the X-Ten proposal initially made by Xerox Corporation but abandoned by Xerox before it reached fruition at the agency.

The FCC has recently recognized the stifling effect that its long administrative processes can have on innovation and on the ability of smaller companies to raise the capital necessary to create new developments. It has therefore proposed to give a "pioneer's preference" to innovators, rewarding them with a headstart in the marketplace if their idea is successfully adopted through new rules. But even this proposal has created controversy both as to the definition of what is truly a "pioneering innovation", and as to what the rewards should be to assure that the innovation, in fact, achieves the widest use in the marketplace.

The last decade of advances in wireless technology has occurred in the context of -- and, indeed, in spite of -- these administrative procedures. And the next generation of wireless networks will similarly be subjected to these administrative processes as the Commission continues to allocate a very valuable and limited resource -- the radio spectrum -- among numerous competing demands.

Licensing Issues

Once the FCC has decided to allocate spectrum, either by changing the rules for the use of a particular band or by the creation of a new radio service in a unique radio band, only a part of the process for getting service to the public has been completed. The FCC's history suggests that as much time can be spent in actually issuing the operating licenses for the newly created service.

Over the last decade of wireless system growth, the Commission has tried a number of licensing schemes for wireless communications technologies, from cellular to mobile satellite to private radio SMRs. In each case it has achieved mixed results in speeding service to the public. A brief review of some of the Commission's past approaches is therefore instructive.

A. Cellular Licensing

It has been over eight years since the FCC first accepted applications for cellular licenses for the largest thirty markets, and it is likely to be as much as two more years until the last of the cellular licenses is awarded. During that time the FCC has tried a variety of licensing approaches designed (a) to determine the most appropriate candidate for the license while (b) limiting the applications process to parties truly interested in providing cellular service to the public.

At first, the Commission awarded cellular licenses only after comparative hearings at which the applicants were considered on the basis of which one proposed the best service to the market. In part by reason of the expense of prosecuting such applications -- both in preparation of the comparative case and in the administrative litigation that followed the filing -- the number of applications filed for the largest cities ranged from a high of thirteen to a low of only two (an amazing anomaly in view of the thousands of applicants who filed for the much smaller, less valuable MSA's).

The comparative process had the benefit of limiting the number of applications, and presumably subjected applicants to scrutiny as to the sincerity of their proposals. But it was both time consuming and staff resource draining. Moreover, many of the applicants, recognizing the risk of the litigation, settled the litigation among themselves and apportioned the license ownership voluntarily; therefor, any perceived benefits of the culling process were not being obtained from the hearing in any event. And on review of the various hearing decisions, it became clear that the only valuable distinguishing criteria was the coverage proposed by each applicant -- in one instance the ONLY difference between the applicants was a thirty-two square mile area of coverage, and that difference was the decisional factor. In the broadcast arena, program responsibilities and proposals might have an impact on the public interest standard. But in the common carrier field, where minimal technical qualification differences were not comparatively significant, the FCC realized that comparative analyses would at best yield miniscule differences among applicants which could not justify the burden of the hearing processes.

The Commission then chose to award cellular licenses by lottery, deeming all applicants who could meet minimal qualifying standards to be equally qualified to hold the license, thereby justifying the "choice by chance" approach. However, with the skyrocketing value of cellular licenses having been established in both the public and private marketplaces, these lotteries were viewed by the investment marketplace as excellent "get rich quick" opportunities. In order to assure that existing applicants were not frozen out of the lottery, the Commission removed virtually all vestiges of eligibility hurdles; as a result, such diverse interests as investment partnerships, estates, and family trusts were all applying at dizzying pace.

Moreover, most licenses, once won, were very quickly sold to existing operators either to increase their general portfolio -- and thus their overall value in the public capital market -- or as strategic additions to larger, regional systems. In essence, then, the licensing process was creating a private auction of the awarded franchises, since the potential that the serious operator would win a license was so small that it was easier for many such operators to simply avoid the application process and instead concentrate their energies on the after-license-grant acquisition activities.

The Commission tried several methods to limit the number of purely speculative applications while expediting the time between the filing of applications and the grant of licenses. It moved from imposing stiff pre-application financial requirements to limiting consideration of the financial qualifications only to a post-lottery certification by the lottery winner; from allowing cumulation of lottery chances to encourage partial settlements to eliminating any opportunity to cumulate lottery chances through pre-lottery settlements; from pre-screening applications to eliminate ineligible applicants from the lottery to screening only the winning application; from ranking ten lottery winners (to avoid a redrawing if the winner was dismissed) to choosing only a single winner; from allowing limited cross-ownership and pre-lottery alienation of interests in applicants to prohibiting all such activities. Despite all such approaches, the agency received from 300 to 1,000 per market for each of the over 600 markets which have been franchised under the lottery procedures, with the vast bulk of such applicants coming from investors and investment groups as opposed to existing operators or communications-oriented companies.

Effectively surrendering to the inevitable speculative nature of the cellular applications processes, and deciding to put speed of getting service to the public ahead of precedential policy, the Commission has even "construed" its long-standing policy prohibiting the sale of a bare construction permit -- i.e., a permit as to which the licensed system has not even been constructed -- in order to allow lottery winners to sell their permits immediately after grant. Rather than effectively choosing the "best" cellular licensee, then, the cellular licensing scheme has created -- with great agency expense and resource -- a private auction for the limited number of franchises available.

Mobile Satellite

The Commission took a very different tack in choosing the Mobile Satellite licensee. The agency announced very stringent financial and technical requirements for applicants, and set a "date-certain" deadline by which all applications had to be filed. A very limited number of parties applied under these constraints.

Rather than pursue comparative hearings or lotteries, however, the Commission decided that each of the applicants who was willing to establish its financial ability by the deposit of very hefty investment capital would be given an ownership interest in the licensee, and then ordered the applicants to negotiate in good faith the terms of the consortium that would be so created.

In this way, under the threat of getting no interest in the license, and recognizing that only well financed organizations would be ultimate players, the Commission was able to "force" the creation of a single licensee applicant for a single license, a "required" settlement. While the parties engaged in lengthy and often acrimonious negotiations, the nature of the parties -- being well heeled and generally involved in the satellite or mobile industries -- and their desire not to be excluded ultimately saved substantial time and commission resources in awarding the license. This approach was particularly effective in this service, where the capital requirements to construct and operate were high, and the available licenses -- one -- very limited.

Private Radio SMRs

The Commission has chosen two different approaches to the award of the Specialized Mobile Radio licenses, which authorize private entrepreneurs to offer two way dispatch type services to business customers under the restrictions which govern private, as opposed to common, carriage. While SMRs also can offer services interconnected to the public switched network, capacity and eligibility limitations generally make this an expensive service for the subscriber or an unattractive offering for the system operator.

Most SMR channels in the 800 MHz band are awarded on a first-come-first-served basis. The licensee must find an area where the requested channels are not in use, and once awarded, the licensee will receive protection from co-channel use within a designated wide area. Each licensee may only apply for a limited number of channels at one time, and additional channels may be requested only after the initial channels are loaded with a certain number of subscribers. Moreover, if the awarded channels are not utilized within a given period of time, as measured by the number of subscribers per channel, the unused channels will be reclaimed. If a licensee needs more channels to expand its system and none are available in the area, it will go on a waiting list, waiting for the reclamation of underused channels.

For SMR channels in the 900 MHz band the Commission has chosen a lottery approach, with a date-certain filing period for each of fifty designated filing areas. Each winner of the lottery was awarded ten channels (without regard to how many they thought they needed) and all winners were required to meet certain deadlines for (a) constructing its system and (b) loading the system with subscribers.

While the SMR industry has grown under this licensing regime, it has obvious drawbacks. The lottery approach drew many speculators, hoping to win frequencies which they could sell to parties interested in expanding their systems. The waiting list approach, however, tends to create disincentives for growth; if an operator is successful in loading its initial system, there is no assurance that channels will be available to increase capacity to add more subscribers. As a result, an active transactions market for partially loaded or unloaded channels is created, the same private auction which resulted in the cellular context.

Standardsmaking

Finally, it is instructive to consider the Commission's different approaches to standards setting, in the context of assuring equipment interoperability from system to system, area to area. The Commission has tried a variety of approaches to achieving intersystem compatibility and spectrum efficiency, from setting absolute technical specifications for the use of a particular band to leaving to the licensees absolute flexibility over the technical specifications for the use of its licensed channels.

In the SMR arena, the Commission has consistently rejected calls for standardizing on the operating protocol used in SMR systems. Instead, it has left to the manufacturing community and the marketplace to determine whether a standard would be used. In fact, no universal standard has been adopted, and instead the subscriber unit of one manufacturer is not typically usable in the system built by another manufacturer. In this regard, the dominance of one manufacturer has been encouraged, as the lack of interoperability has limited the marketability of systems that do not use compatible -- i.e., the same manufacturer's -- equipment. As a result, operators who are not committed for the long term must consider the value of being tied to one manufacturer or another if its system is to be attractive in the future to other operators who are looking to it as a valuable expansion opportunity.

A very different approach was taken in the initial cellular rules. Concerned that cellular services should develop into a nationwide industry, and in particular that universal roaming ability must be assured for cellular subscribers moving from one market to another, the Commission adopted very strict operating protocols, and required that all customer units had to be capable of operating on ANY cellular system, regardless of the manufacturer of the base station equipment used by any given licensee. As a result, the subscriber unit market has developed independent of the system equipment market, and only a few of the system equipment manufacturers are even participants in the subscriber marketplace. As desired, universal roaming capability has been achieved.

However, in recognizing the need to introduce digital technology into the cellular spectrum, the Commission decided on a very different approach. The agency was concerned that digital technology was not sufficiently mature to decide among approaches to increasing spectrum efficiency. It was also desirous in any event of furthering its policy of relying on marketplace rather than regulatory forces to make such decision. The Commission therefor decided to allocate additional spectrum to the cellular service to meet its expansion requirements and to give licensees absolute flexibility to choose the technology, bandwidth, emission characteristics and other technical features to be used in the newly allocated additional spectrum, thereby leaving to the licensees the choice of technical approaches to solving their capacity problems in the most spectral and cost efficient fashions. The only caveat was that consumer units that conformed to the existing operating protocol -- which assures universal compatibility -- would have to be assured the ability to obtain service in some portion of the licensee's allocated channels, even if new technologies were introduced. The Commission recognized that this might require dual mode -- analog/digital -- cellular phones for some transition period. It nevertheless viewed this as a reasonable compromise between those who favor absolute government standardization and those who would rely entirely on the marketplace.

Indeed, with the flexibility granted by the agency, two unique standards -- Code Division Multiple Access and Time Division Multiple Access -- have been developed. TDMA has been endorsed by the cellular industry trade groups as the standard of choice. CDMA is, however, being studied carefully by a number of large system operators, who view its immediate availability as a better short term solution to overwhelming capacity problems than the long term benefits of the as-yet untested TDMA. Whether this dichotomy will result in two standards, or a de facto CDMA standard overwhelming the industry endorsed TDMA approach remains to be seen, as the cellular industry wrestles with the decision as to which approach will most quickly resolve ongoing capacity problems.

Personal Communications Services -- The Next Regulatory Challenge

It is virtually impossible to get through a week without reading the acronyms CT-2, CT-3, PCN, DECT, GSM, CAI, FDMA, TDMA, CDMA. These are the buzzwords for the concept of a ubiquitous Personal Communications System, in which individuals will be capable of calling, and being called, on a phone identified to them, rather than on a phone identified with a particular station. The term "Personal Communications Services" covers a wide variety of potential offerings. Because cellular service is capable of providing "portable" service, these new ideas have been distinguished from the macro-cell technology of conventional cellular systems by their anticipated use of a "microcellular" design approach.

Suffice it to say that major policy issues need to be addressed by the FCC before PCN services can become realities. The Commission is currently considering the broad variety of issues raised by the potential growth of personal communications in a Notice of Inquiry in Docket 90-314. Obviously, there is a need to test and prove the effectiveness of the technologies being discussed to digitize the mobile spectrum in a way which would allow microcellular technology to operate effectively in a consumer-oriented telecommunications service. Indeed, the FCC has recently issued a myriad of developmental licenses, with more applications pending, to a variety of applicant proposals to design and test in numerous markets the viability of different types of PCN and CT-2 and CT-3 services and facilities, using various technologies. These developmental proposals will, if effectuated, establish not only whether various technologies can work effectively in urban, suburban and rural environments, but also whether such technologies will allow for the sharing of spectrum with different types of existing users, and also, to a lesser extent, whether there is a substantial consumer interest in particular levels of service.

Even assuming the availability and capability to effectively implement the technologies being considered for microcellular technology, the Commission will have to consider many substantive issues before it can conclude either that a separate frequency allocation is appropriate for PCN and PCN-related services or that some relaxation of technical rules governing various spectrum is necessary to allow PCN services on a shared basis. Among the many issues to be considered will be whether there is a need for a separate PCN allocation, or whether existing services can be encouraged to provide these personal services by the relaxation of existing rules. The Commission will have to decide how it should license any systems that it decides to authorize. And it will be faced with the choice of mandating a particular technology for such services to assure network compatibility or leaving such choice to the marketplace, with the potential that each service provider would market proprietary customer equipment which would not be compatible in other markets.

These issues are all presented for consideration in the Notice of Inquiry in Docket 90-314. Initial comments in this proceeding were received in early October, with more than 100 parties filing substantive comments. Not surprisingly, virtually every segment of the communications industry weighed in with an opinion on one or more of these issues. Existing users of the spectrum and existing service providers questioned the wisdom, need and efficiency of a separate allocation of valuable spectrum for a still untried, and questionably valuable service, while the more entrepreneurial groups urged expedited consideration of a separate allocation of anywhere from 140 to 200 MHz for a new PCN radio service, principally in the 1.8-2.1 GHz band. Nor was there unanimity on the technical standards which would govern the use of any allocated spectrum, with proponents of Time Division Multiple Access and Code Division Multiple Access split as to which of these technologies will provide the highest quality, lowest cost, spectrally efficient and greatest capacity for such services.

That there is interest in the development of advanced Personal Communications services and systems cannot be gainsaid, based solely on the size of the response to the Notice Of Inquiry in Docket 90-314. On the other hand, the ability to achieve a consensus from such diverse interests, absent a substantial technological breakthrough which would avoid the need for new regulations or allocations -- for example by the development of systems and products capable of operating on a large scale basis under the Commission's Part 15 rules -- appears achievable only after a long, arduous, and likely rancorous rulemaking proceeding, which is certain to include highly complex social, economic and political issues and require the delicate balancing of significant interests. Such a regulatory structure does not appear likely to provide a short term framework for the commercial development and introduction of new technologies.

A Recommended Approach

So long as spectrum allocations are to be governed by administrative procedures, and scarce resources are to be allocated only after the opportunity for public comment and debate -- fundamental precepts of our democracy -- the ability of the government to introduce technological advances into our communications capabilities will necessarily be limited, and will require slow, often painstaking processes. On the other hand, the inability to act unilaterally and without due process does not need to translate into an inability to act decisively once that the evidence establishes that there is a public need for a new service and/or technology which cannot be fulfilled within existing allocations or regulations.

The Commission has a variety of precedent to look to in choosing the best approach for bringing Personal Communications Services to the American public. It also has the benefit of being able to encourage such development on the foundation of an extremely advanced wired and wireless telecommunications network. In other countries who are currently expediting the licensing of PCN-type services -- with varying degrees of real success -- the telecommunications infrastructure is not advanced, and thus allocations need to be made even before technologies have proven out and demand for particular services has been developed. The FCC, however, can afford to wait for the completion of the many developmental projects which are already underway before making any leaps of faith on the outcome of such developments. By waiting until concrete evidence exists of the demand for such services, the ability to meet the demand with the available technology, AND the inability to meet the demand within existing frequency allocations and regulations, the Commission can better assure that regulatory approaches and solutions do not run past the state of technology. By putting the creation of a new service before the demand and technology to meet it have been proven, the Commission runs the risk of creating enormous negative impacts on existing service providers and spectrum users without any offsetting public benefit from such decisions. One need only look at the Commission's disasterously premature handling of the DBS Service which was created over a decade ago on the promise of immediately foreseeable services, at great expense to existing licensees of the 12 GHz band who had to move to other frequencies, and in which today there are still no concrete plans for a satellite launch which will use those frequencies for a high powered DBS service, to see the disasterous consequences of such precipitous actions.

If a new radio service is to be created for the PCS group of services, then in choosing a regulatory approach, the Commission should recognize that, precedentially, it has been most successful when it has allowed the marketplace, rather than its applications processing procedures, to govern the timing and location when such services are introduced into a given market. For example, using the approach utilized in the initial licensing of the 800 MHz band for SMRs, the Commission should rely on interference criteria, rather than market designations, to determine how many and when microcell systems will be able to operate in a given metropolitan area, and leave to the marketplace, rather than to specific regulatory standardization, the determination of operating protocols. Such an approach is more likely to avoid long delays in the licensing process than to create them. By restricting eligibility to those parties who are financially able to construct the proposed system, minimizing those instances when comparative analysis is necessary to avoid mutual exclusivity, and imposing strict performance standards on parties who are granted a license to assure that they construct and operate the systems they propose -- or face license forfeiture not unlike the revocations which occur in the SMR industry -- the Commission is most likely to assure the quick implementation of a new radio service without incurring the undue time delays and resource expenses which have characterized its cellular licensing programs.

In conclusion, it cannot be denied that technology is capable of driving the movement to a wireless society, allowing the consumer to access the underlying telecommunications network on a personalized basis without the limitation of a wire or cable. If the limits of technological innovation are to be achieved in this country, the federal regulatory regime -- from Congress through the executive branch and into the Federal Communications Commission -- will play a key role in determining not only what technologies are favored, but also what markets are served, and how.

Technologies that can share spectrum with existing users or substantially increase the capacity of existing services should certainly be favored over less efficient proposals. The FCC will likely be forced to deny spectrum to certain uses in order to provide the most economically and politically favored users adequate spectrum for meeting anticipated demands. While European models could hold some influence over the decisionmaking, the domestic needs of consumers and industry must ultimately be the model used to determine allocations. Most importantly, the Commission should not allow the exuberance of technological advances designed to cure clearly ineffective communications networks in other countries to drive it to hasty decisions which could negatively impact the highly advanced wired and wireless infrastructure already in place domestically.

The technologists role will be to continue developing greater spectral efficiencies into devices at lower costs, so that manufacturers and users are incented to utilize such devices and systems. The regulators role will be to accommodate those systems and services that achieve the greatest spectral densities for the most valued uses. The likely confluence of private and common carriage, of personal and business communications, and of wired and wireless networks into a seamless ubiquitous system, will challenge the limits of both the technologists and regulators creativity in satisfying the public's demand for advanced communications capabilities.