

security of radio transmissions is likely to result in sophisticated encryption capabilities for PCS. But these same encryption capabilities may have other types of applications.

Ultimately, any telecommunications service involves the transmittal of information. PCS technology will not evolve independently of other information technologies. Rather, PCS will evolve with other information technologies to accomplish new tasks or to complete old chores more efficiently and expeditiously. Businesses and residences will change the way that they conduct their businesses and their consumer activities to take advantage of these new opportunities. Thus the development of PCS and the development of the public network are intertwined.

**Two examples of new telecommunications services that could evolve with PCS.**

To understand how telecommunications will fundamentally change the way business is conducted, consider how information services and communications services could be combined to meet the needs of a specific localized set of businesses: real estate agents. These independent businesses are in the business of processing information. They collect information on available real estate for sale, and disseminate that information to other agents and to potential buyers. In the process of closing a transaction, they manage the

flow of a variety of financial and legal information among several parties.

Historically, this information was processed largely through voice phone calls, fax machines or face-to-face contact. In some communities, the multiple listing service is now computerized, so some of this information is now exchanged electronically. But one can envision a much more sophisticated use of technology to serve these businesses. A distributed data processing system could exchange not only the obvious data about each property — location, listing agent, physical characteristics — but also could communicate video images of the property or digitized site plans. This information could be encoded so that data could be returned in various forms, including via personal computers or terminals, via fax, or via electronically-generated voice messaging. The network might use geographic information systems to provide immediate information about location of the property with respect to roadways, sewer and water and other infrastructure, zoning, adjacent land uses, soil type, special hazards such as flood zones, and nearby commercial or government services. The network could also process inquiries for further, more detailed information about properties via direct phone call, voicemail, or E-mail. The result would be data that could be accessed from not simply an office, but also from wireless connections in the field (which may or may not have data or fax capability). To assist agents and buyers, data queries could be used to obtain a list of all available properties that met some

buyer's general set of criteria as to price, location, and physical characteristics. With proper security and financial arrangements, this system could function as an electronic market to exchange offers to buy and sell. In the closing process, the system could provide necessary data to financial institutions and lawyers, and facilitate their interactions.

This electronic marketplace for real estate is truly an integrated system, and PCS is an essential component. It would be capable of delivering real-time data to the entire set of users at any time and in any location. Users can change the way they conduct their businesses based upon the ubiquitous service that is afforded. The integration offered by this system cannot be achieved by piecemeal installation of incomplete systems. For example, PCS would be a very important part of making this system ubiquitous. But the system must be designed to deliver electronically encoded data over the PCS handset. The separate components of an integrated system are designed to provide a synergy that piecemeal approaches cannot accomplish.

This type of multi-media, electronic market could be envisioned for a wide array of business applications. Our business communities have a large number of these "communities of interest" that spend a large part of their time and resources exchanging information that is essential to their businesses.

And much the same situation arises in our families and civic groups: Many of us find that the most difficult part of participating in local civic organizations, whether the PTA, the local planning council, local service organization, or the community theater, is the time-consuming process of arranging meetings, balancing schedules, and providing communications. Once again, one can easily envision a distributed data system for a community that provided a convenient means to accomplish these tasks. A "community calendar" could be maintained that held the schedule of scholastic, civic and cultural events. The system could be used to schedule the use of local meeting halls. A voicemail/E-mail feature could deliver messages to members of groups without either the delays of postal service or the tedium of making dozens of individual calls. Certain types of commercial events, such as concerts and exhibitions, might be advertised for a fee to help defer the cost of the system. Electronic classified advertisements ("piano lessons available") might also be included in the system.

Obviously, for such a service to effectively penetrate this residential market, ease of use is essential. Not all users will own or want to use personal computers. The system must be able to use intelligent information services to deliver this information in various forms over various media. With electronically-generated voice messaging, for example, the harried parent-chauffeur might use wireless communication to check meeting times and places. PCS can extend the range of options available under such a system, and

such a system can make advanced PCS features more attractive and valuable to residential users. This is the kind of synergy between the evolution of PCS and telecommunications that we addressed earlier. This is what is necessary to achieve the FCC's vision of a rich variety of applications and widespread customer acceptance, and it cannot be achieved with a piecemeal approach.

**Large businesses already have many sophisticated telecommunications options. Development of mass markets for telecommunications services is especially important to small businesses and residential customers.**

Neither of these two systems, nor dozens of analogous systems that one could imagine, are science fiction. The technology to deploy such systems is either already in hand or clearly within reach. Larger business and government institutions have already installed analogous systems. The real question is how diverse groups that lack the resources of a single large institution can access the same type of efficient communication services. Cost, product design, and integration with other information services will all be important to the broad dissemination of such systems.

## V. LEC ROLE IN PCS MARKET DEVELOPMENT

As the FCC envisioned in its Notice, the LECs have an important role to play in the deployment of supporting technical infrastructure for PCS. But LECs also have an essential role to play in market development. Indeed, these two functions must go hand-in-hand.

**Development of mass markets for telecommunications products, including PCS, will require a sophisticated customer education and support process.**

If we return to the example of the electronic real estate market, we can illustrate how marketing activities must proceed to develop such fundamentally new applications.

To deploy the real estate marketing system, the first step would be to understand how real estate agents use information, what information they exchange most frequently, and how they currently exchange that information. This requires an understanding of the sometimes subtle distinction between information that is widely shared and information that is held more closely by realtors for competitive reasons. From this background, the system can be designed to produce benefits that users value with respect to speed and ease of

access to information. For example, if the ability to access voice-encoded information from a mobile phone is important, then the cost of constructing and maintaining such an encoding system may be justified. Exactly the same questions must be addressed with respect to any number of other possible enhancements to the system.

The process of installing such a system will be evolutionary. The initial systems would incorporate those options that are of greatest value to users and that face the fewest technological hurdles. As the success or failure of various features was revealed, the system would evolve to better meet the demands of users.

Throughout this process, a very effective customer education and support process must provide high quality needs-assessment, service-tailoring, and field support to customers, and must also provide feedback to the various vendors involved about user reactions to features and design of the system. This customer education and support process is, in fact, a crucial component in this development. This process is usually accomplished by a team drawn from across functional units in the lead firm. These team members include representatives from sales, operations, and customer service. For very large customers, a team may be assigned to a single customer or to a few customers with very similar needs. But for smaller customers, especially in the communities, the customer education and support process must use this same team approach to

serve effectively a large set of customers. Hence, there must be a wide variety of products to sell, in order to justify the individual attention to each smaller customer or community group. This concept of "multi-tiered selling", in which the resources of the company are structured to meet the demands of customers of varying sizes and characteristics, is vital to efforts to sell new products into markets characterized by many small customers. Otherwise, only selected groups of customers would be served well and not the broad community: Larger businesses and wealthy customers would have a variety of rich applications, while smaller customers and communities would have only simple, disconnected services.

The learning costs involved with establishing such a system are unlikely to be recouped in a single such "community of interest" network. Rather, the firm that designs and delivers such a system must have a long-term interest in deploying and maintaining such systems for large numbers of similar communities of interest. The lessons learned in the construction and maintenance of these systems must be readily transferred to analogous applications in other communities. The customer education and support process must use the customer relationships it establishes to develop an understanding of the potential uses of its products in other applications by those users. For example, the process of helping a small firm access such a network may open opportunities to help that firm upgrade its other telecommunications functions. Similarly, in working with a local community network, the customer education and

support process must identify the opportunities to help local civic and scholastic organization better accomplish their communications functions. This is a long-term venture, not an "install and leave", or mail-order, operation.

**The LECs have a unique commitment to developing new telecommunications markets and especially in promoting these products to smaller businesses and residences.**

The LECs bring several important and unique capabilities to the task of mass market development in telecommunications. No other set of firms brings these broad capabilities to this task of mass market development.

The LECs have a fundamental commitment to expanding telecommunications markets to serve all users. Their infrastructure will continue to be a key component in the telecommunications network. Greater use of that infrastructure is vital to their long term evolution. Increased use will lower the per-unit costs, and permit further expansion into cost-sensitive sectors. To justify increasingly sophisticated (and expensive) investments in new switching and transport technologies, the LECs must continue to build the use of the public network.

The commitment of the LECs to the public network gives them a unique interest in broad telecommunications development. All other

sellers are either indifferent to fostering greater use of the public network, or are selling products that reduce use of the public network. Because expanded use of telecommunications services by small users often involves significantly greater use of the public network but only modest increases in the use of other telecommunications resources, other vendors cannot realize the necessary sales margins in these accounts to warrant intensive marketing. Conversely, the LECs have relatively little strategic interest in helping large users build stand-alone networks or customized in-house features that drain business from the public network. The natural market for the LECs is the broad set of smaller businesses and residences whose future is linked to development of the public network.

This commitment by the LECs will propel them to develop mass markets for new telecommunications services, of which PCS is one of the most promising. Moreover, their strategic interest is not simply to market their own products to mass markets, but also to promote the distribution of third-party ("enhanced service provider") applications and services that are distributed over the public network. Their customers gain from products that expand use of the public network and that add value to public network services.

The LECs' commitment to broad telecommunications market development is not only the result of their large embedded infrastructure. The increasing use of incentive regulation by state regulatory commis-

sions rewards increased use of the network. Moreover, greater network use reduces the pressures on local rates and also reduces the relative burden of guaranteeing universal service.

The LECs have the financial resources to make the necessary investments in physical assets and in the long-run process of market development. Rapid and broad PCS deployment will require strategies that are based not upon short run cream-skimming of the most lucrative market segments (which are likely to be large businesses and wealthy customers) but upon the long run process of building and serving a wide customer base.

The LECs also bring well-established market relationships with the broad set of small businesses and residential customers. They have an established reputation for quality service throughout all communities, which is particularly important for smaller customers with limited technological background. This customer trust provides an important assurance that investments in new equipment and in new ways of conducting affairs will indeed improve their communications functions. (This reputation is also important to value-added applications providers who will invest in the development of new products that rely upon features of the public telecommunications infrastructure.) The LECs have established customer service functions with a long record of quality service. The LECs have an embedded knowledge base that includes both technological knowledge and a solid understanding of the customer base, especially in small

businesses and residences. This embedded institutional knowledge provides a unique base from which to serve an expanding telecommunications market.

**No other set of firms brings a similar commitment and set of institutional capabilities.**

The strategic imperatives and institutional capabilities of the LECs are truly unique. No other firms have the commitment to the public network or to the small businesses and residential customers whose telecommunications futures are so closely linked to the public network. No other firms combine the broad, well-established institutional capabilities in customer education and support that the LECs possess, especially in the hard-to-serve small business and residence market segments. The reputation of the LECs for quality service in the small business and residential market segments reflects their unique, long-term commitment to this market. If the LECs are excluded from PCS market development, the evolution of both PCS and the broader network will suffer greatly.

**VI. NET EFFECT OF CROSS-OWNERSHIP BAN**

**The net effect of the proposed cellular/PCS cross-ownership ban upon rapid PCS market development is clearly negative.**

The Notice acknowledged the importance of LEC participation in PCS development. But the proposed ban on cross-ownership of PCS assets and cellular assets has the *de facto* effect of excluding most LECs from participation in PCS market development.

When we see PCS evolution as one component of a broader telecommunications evolution, the costs of excluding LECs from PCS deployment are clear. To the extent that PCS becomes essentially a stand-alone service that is simply hooked onto the network, both PCS and broader telecommunications development will suffer. Some PCS features may be unattractive without broader telecommunications changes, and some potential telecommunications options may be less attractive if advanced PCS features are not installed.

The FCC tentative decision to exclude LECs from PCS deployment seems to be based upon two conjectures. First, cellular license holders may ultimately be able to provide PCS service within their existing cellular spectrum. Second, even if the services remain distinct, PCS and cellular may ultimately compete in at least some areas of mobile communications.

But do speculative technological extrapolations provide a sound basis for regulatory strategy? That is, if the decision to exclude LECs from the PCS market is based upon technological assumptions that later prove to be false, does that policy risk unnecessary failure? And does the policy of excluding major potential players until technology evolves make sense if the goal is rapid deployment of the services today?

There is wide agreement that cellular and PCS will initially be aimed at substantially distinct markets. Cellular will continue to be a relatively expensive service that is attractive to fast-moving vehicular users. PCS is expected to have a significant cost advantage and is also expected to support smaller handsets with longer battery life, but without the capability to serve fast-moving vehicles. This will make it most attractive for widespread pedestrian use in urban and suburban areas. Hence cellular and PCS will serve very different markets.

For rural areas, it is not clear whether the relatively small PCS cells will be able to generate sufficient traffic to become economically viable. PCS may be most attractive in rural areas as a replacement for the wireline service in sparsely populated areas. In these markets, wireline, PCS, and cellular may be inherently complementary products.

Even if technology evolves so that the LECs are eventually able to provide PCS within existing cellular spectrum, their involvement will be delayed until the technology develops and until the important cellular marketing issues (such as analog to digital technology conversion) are resolved. In the meantime, the deployment of PCS will be slowed significantly by the inability of other market participants to mount an effective mass marketing effort. There is a particular risk that smaller users will have only limited, relatively unsophisticated PCS services available to them. The narrow set of PCS services marketed during this hiatus, and the correspondingly limited infrastructure choices, will have a long-lasting and negative influence on how the market develops. Least likely to be served under this scenario are smaller businesses and residential customers. These are the market segments where marketing is most difficult, where the margin per account is smallest, and where user sophistication is lowest. Thus, the costs of excluding LECs from PCS deployment are very high for the nation.

## VII. REGULATORY STRATEGIES TO PROMOTE PCS COMPETITION

**A policy of issuing five PCS licenses is a superior way to promote competition.**

In its Notice, the FCC suggested that the benefits of excluding existing cellular franchise holders would be faster deployment of PCS and lower prices for both services in the long run. As we have discussed above, the strategy of simply excluding the LECs from PCS market development will be an unnecessarily costly and risky regulatory strategy. When we examine both of the suggested benefits of excluding LECs with cellular affiliates, we find that exactly the same objectives can be more effectively promoted simply by issuing five PCS licenses (instead of three).

First, from our perspective as a firm that provides strategic management consulting services to telecommunications firms, we can attest that no PCS franchise holder, including those affiliated with cellular carriers, would consider delaying the deployment of PCS. Everyone associated with the telecommunications industry understands that technology and service options are evolving at very rapid speed, and that no firm can fall behind in this race. PCS is certainly viewed as a key technology in this evolution. It is inconceivable that any firm would risk falling behind in a market whose national potential is estimated at 60 million sub-

scribers in order to protect its current market in cellular, which is a relatively mature and different technology with current national subscription of about 9 million. No competitor in this industry would entertain this strategy for a moment; no executive in this industry would put forth this strategy for consideration.

The FCC's plans to license three providers (at a minimum) in each service territory guarantees that, even if both cellular franchise holders were granted PCS franchises, there would still be one non-cellular PCS operator. Moreover, a LEC with both cellular and PCS interests would have different technological and market strategies than the non-LEC cellular operator. In the dynamic process of developing new markets, the number of competitors will be less important than the diversity of strategies among the competitors. These differences of interests between the two cellular operators create a competitive tension that will be absent if there are three firms with very similar market positions. Particularly troublesome would be a situation in which all three PCS suppliers pursued a short run strategy of targeting only the most lucrative market segments, or pursued a strategy of providing only simple, unsupported services that were disconnected from broader telecommunications applications. Obviously, if the FCC awarded five PCS franchises, and allowed all types of entities to vie for these licenses, the range of competitive strategies would be much greater than if three licenses were awarded strictly to non-cellular, non-LEC interests. For that reason, the award of five PCS licenses without

the cross-ownership restriction better meets all of the FCC objectives.

The second, longer run question of how well cellular and PCS might ultimately compete to drive prices down is necessarily a more speculative issue. We do know that initially the two services will be targeted at generally distinct applications. Predicting technological and market evolution is an inherently risky effort. Rather than commit itself to the policy option of restricting LEC participation in PCS market development, the FCC can adopt less risky policy courses. Clearly, a strategy that issues five licenses (or at least reserves the necessary spectrum for five licenses) dominates the strategy of issuing three licenses strictly to non-cellular interests. The policy of issuing five licenses is consistent with both the long run concern about competition as well the shorter term concern about speed of deployment. Moreover, the FCC retains the flexibility to respond through additional rulemaking at a later date should its worst fears about non-competitive behavior by joint PCS/cellular license holders be realized.

In sum, the FCC has available the more resilient and effective policy option of issuing five licenses. This policy route avoids excluding LECs, whose participation the FCC finds desirable, from PCS deployment.

### VIII. CONCLUSIONS

The conclusions from our analysis are clear. Rapid PCS deployment will require effective market development as well as rapid technological innovation. Moreover, the evolution of PCS is interlinked with the broader evolution of sophisticated telecommunications services. The LECs have a unique and essential role to perform in this process. Their participation is necessary to insure that all customers enjoy the benefits that new telecommunications services can bring to their lives. Excluding LECs from PCS participation because of the cellular cross-ownership ban is an unnecessarily restrictive and costly regulatory strategy. The FCC can address its competitive concerns more effectively by issuing five licenses (instead of three) and allowing the unfettered competition among PCS suppliers with diverse technological and market development strategies.

**AUTHORS' BIOGRAPHIES**

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**Jonathan Byrnes and Co. is a focused consulting and research company specializing in providing management and regulatory consulting services to major telephone companies, involving three related areas: (1) strategy development and planning; (2) integrated market development; and (3) regulatory strategy and submissions.**

**The following projects represent recent work done with multi-billion dollar telephone companies, chiefly RBOCs:**

**Worked with a major telephone company to develop its strategic planning process and its first post-divestiture strategic plans. These included both positioning within the telecommunications industry and related diversification.**

- Guided another telephone company in developing an integrative business planning process. Also helped a telephone company to change its administrative systems, including planning, budgeting, control, compensation, and promotion.**

- Consulted with a telephone company to develop a marketing planning process that integrated the company's various business units in order to develop individual markets.
- Assisted a telephone company to coordinate the sale and delivery of its products and services, and to position it to market and distribute other firms' products and services.
- Worked with a telephone company to accomplish comprehensive organizational change, including selective decentralization, downsizing, cultural change, and management development. Directly counseled the CEO on a continuing basis on his crucial role in changing the company in advance of a crisis.
- Worked extensively in regulatory proceedings. Prepared submissions for State PUCs, the FCC, the NTIA, and Judge Greene.

Dr. Byrnes has led a number of projects that have produced high-value and lasting innovations. He has advised senior executives and client project teams involved in repositioning major telephone companies, and he has contributed to basic changes in telecommunications regulation. Dr. Byrnes also has advised senior executives in other industries on strategic adjustment to industry change.

He earned a DBA from Harvard University in 1980 and an MBA (Smith Prize) from Columbia University in 1974. His Harvard dissertation

focused on corporate strategy and diversification of regulated and deregulating companies; at Columbia, he was Editor-in-chief of the *Columbia Journal of World Business*. He has served on the Board of Directors of the Harvard Coop, a chain of department stores serving the Harvard and MIT communities.

Dr. Byrnes worked as an advisor to the Indonesian State Minister of Administrative Reform. He reorganized a major industrial development program that included industrial estates and infrastructure, and a sweeping restructuring of the national government. Several important new urban and industrial centers resulted, including the Batam Island - Singapore complex.

Dr. Byrnes is the author of over fifty books, articles, cases, notes, reports, and expert submissions. He is the author of *Diversification Strategies for Regulated and Deregulated Industries: Lessons from the Airlines*, and a contributor to the Harvard Business School textbook, *Logistics Strategy: Cases and Concepts*. He also has taught Strategic Management in a High Technology MBA Executive Program, and Managerial Finance.

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His research activities include a number of scholarly publications, and numerous submissions in federal and state regulatory proceedings. He has consulted with public agencies and private firms on a variety of regulatory issues in electricity, telecommunications, antitrust, health economics and natural resource management. Prior to his current academic position, he served as an economist with the Federal Trade Commission and the Department of Interior.