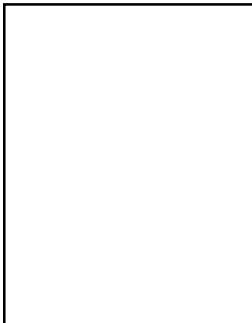


Mobile Communications for the Masses: PCS in the Works

Roger P. Newell



Mr. Roger P. Newell is President of Microcell Strategies, Inc., a telecommunications consulting firm based in New York City, specializing in Personal Communications Services (PCS). He is also a telecommunications attorney, and an instructor in telecommunications for Telecommunications Research Associates, training specialists. He has consulted on PCS-related matters to a number of telecommunications carriers. He published and edited *Microcell Report*,

a newsletter focusing on Personal Communications Services. A graduate of New York University Law School, he has chaired or participated in several conferences on wireless topics.

On March 14, 1995, the Federal Communications Commission (FCC) concluded the largest auction of spectrum in the history of the world. It sold 99 licenses for Personal Communications Services (PCS), and the conclusion of the auction has triggered a race to market by 21 new PCS license holders. The prize they are chasing is a share of a lucrative market for wireless communications, expected to reach over 30 million subscribers by 2003. PCS represents an unparalleled opportunity to invade the local exchange market as well as to create a new industry of mobile communications services. The new licensees will pay a total of \$7.7 billion just for paper licenses, and will have to spend several times that amount to build their networks.

What Is PCS?

With so much at stake, the PCS phenomenon is worth examining. Just what is PCS? A commonly quoted definition is "calling you anywhere, anytime." While this definition is short and pithy, it does not give much detail. There is no formal definition of PCS,

since the FCC has chosen not to limit the service offerings of the licensees, merely requiring them to provide mobile (as opposed to fixed point-to-point) communications. As a result, it is difficult to define PCS precisely. Different PCS operators can be expected to have widely varying views of what services to provide. So another definition could be "any service using the spectrum designated as PCS spectrum by the FCC." (That spectrum is the 1,850 to 1,990 Megahertz band.) But since customers do not care which spectrum is being used, realistically, that definition could be expanded to include similar services offered in any spectrum, including that of the cellular carriers.

Nevertheless, there is a limited list of possible PCS services. These include:

- (1) A "high-tier" mobile telephone service to pedestrians and to vehicles at any speed, equivalent to cellular service.
- (2) A "low-tier" mobile telephone service to pedestrians and vehicles below 30 miles per hour.
- (3) Wireless PBX service—in-building cordless phone services.
- (4) In-building wireless local area networks for data transmission.
- (5) Wireless local loop service, providing phone service to the home or office, competing with the local exchange carrier (LEC).
- (6) Enhanced paging services, including two-way data transfers.

Each operator can pick and choose from this list, based on its perception of what the market wants. While PCS has been celebrated in the press mostly for its ability to provide communications "anytime, anywhere," its greatest importance to telecommunica-

tions may well lie in the opportunity that it presents for dozens, perhaps hundreds, of companies to compete realistically for the local phone market, which takes in about \$90 billion per year. For the first time in more than 100 years, a mass market alternative to the LECs has appeared to threaten their local service monopoly. This threat is more credible than current attempts to bypass the LEC for several reasons.

- Once the FCC has finished the process of auctioning PCS licenses, there will be at least three and perhaps as many as six carriers with the right to provide the equivalent of POTS (Plain Old Telephone Service) to residential and business customers.
- It is considerably less expensive to provide a local loop between the customer's location and the local telephone switch by radio than by using copper wire (it has been estimated that the embedded cost of a copper loop is \$1,200 to \$1,500, compared with \$200 to \$500 for a wireless loop). The PCS compa-

nies may therefore be able to match, or even (optimistically) to undercut the LECs' rates.

- The FCC has preempted the states from placing entry or rate restrictions on the PCS carriers, thereby removing a major legal barrier to new competition.
- Finally, in order to persuade legislators to grant them access to the long distance market, there is a growing willingness among the Regional Bell Operating Companies (RBOCs) to facilitate the growth of local competition. For example, NYNEX recently concluded an agreement with a competitive access provider that would greatly reduce the cost of interconnecting with NYNEX's public network.

As a result, PCS licensees will be in a position to offer POTS with the added advantage of allowing their subscribers to make and receive phone calls in the house, the neighborhood, or anywhere else the subscriber may wish to roam—at rates which are little more than the rates of the LEC. Consequently, it is

Figure 1
FCC MTA Broadband PCS Auction
Winning Bidders by MTA



Source: FCC

likely that, in the coming decade, the current near monopoly of the local exchange market will be severely eroded by PCS.

PCS Market Structure

The FCC divided the PCS spectrum into six licenses, three of them 30 MHz wide and three 10 MHz wide. The United States was divided into 51 Major Trading Areas (MTAs) and 492 Basic Trading Areas (BTAs). (These are areas that Rand-McNally¹ deems to have a community of economic interest.) This represents a compromise between cellular carriers, which had argued that PCS licenses should have a territory

identical to the cellular licensees, and those carriers which urged the FCC to grant PCS licenses on a national basis. The licenses are distributed as shown in Table 1.

The winners of the auction are shown in Table 2. Three more licenses were awarded to Omnipoint Corporation, Cox Cable Communications, Inc., and American Personal Communications on the basis of Pioneer's Preferences,² at a price equal to 85% of comparable auction prices.

Two of these channel blocks, the C and the F, were set aside for Designated Entities (DEs)—small businesses (with assets of less than \$500 million and annual revenues of less than \$125 million), women- and minority-owned businesses, and rural telephone companies. When they are auctioned, a legion of DEs will proceed to do battle with the A and B license winners, including the likes of AT&T, Sprint, and the RBOCs, armed with determination, a limited service territory (and for some a limited bandwidth license), and limited capital. One can only admire the intestinal fortitude of such entrepreneurs.

To assure that there will be substantial competition to the cellular carriers, the FCC prohibited cellular carriers from owning more than one 10 MHz license in their own service area. Outside of this territory, there is no limitation on their ownership of PCS licenses. Six of the 21 MTA licensees are now predominantly cellular companies. This group won 42 of the 99 licenses at auction, covering about 40% of the population. Most of these cellular-based companies are likely to consider PCS to be simply cellular telephone service extended to a new territory, using different spectrum. Thus, for example, the PCS Primeco consortium, consisting of NYNEX and Bell Atlantic on the east coast and AirTouch and U S WEST on the west coast, bought licenses in the center of the country, hoping to create, as nearly as possible, a seamless national cellular network. For this to work, their customers will have to buy dual-mode cellular/PCS mobile telephones.

Market Concentration

As a result of the auction, the bulk of the PCS industry will be concentrated in a very few companies. Of the 99 licenses in the auction, 70 were won by AT&T, WirelessCo (a consortium of Sprint and three of the four largest cable TV companies), and the RBOCs. They also won a large majority of "pops"—persons in each licensee's territory—402 million pops out of a

Table 1
PCS License Distribution

Channel Block	Bandwidth (MHz)	Service Area	Number of Licenses
A	30	MTA	51
B	30	MTA	51
C	30	BTA	492
D	10	BTA	492
E	10	BTA	492
F	10	BTA	492
G	10	BTA	492
Total	120		2,070

Source: R. P. Newell

Table 2
FCC Auction Winners

Company	# of Licenses	# of pops (millions)	Total bid*
WirelessCo, L.P.	29	145	2,110
AT&T Wireless PCS, Inc.	21	107	1,684
PCS Primeco, L.P.	11	57	1,107
Pacific Telesis Mobile Services	2	31	696
American Portable Communications	10	34	447
GTE Macro Communications Corp.	4	19	398
Western PCS Corp.	6	14	144
Powertel PCS Partners, L.P.	3	9	124
PhillieCo, L.P.	1	9	85
BellSouth Personal Communications	2	11	82
Southwestern Bell Mobile Systems	3	7	73
Centennial Cellular Corp.	1	4	55
Poka Lambro Telephone Cooperative	2	2	6
Cox Cable Communications, Inc.	1	2	5
GCI Communications, Inc.	1	0.5	2
Communications International	1	0.047	0.2
South Seas Satellite Communications	1	0.047	0.2

* \$ millions

Source: R. P. Newell

Table 3
Pops Won by Company

Company	Pops (in Millions)
Ameritech Wireless Communications, Inc	8.0
AT&T Wireless PCS, Inc.	107.1
BellSouth Personal Communications, Inc.	11.5
Pacific Telesis Mobile Services	31.0
PCS Primeco L.P.	57.2
Southwestern Bell Mobile Systems, Inc.	6.6
WirelessCo, L.P.	180.7*
Total	402.1

Source: R. P. Newell

*Includes the Pioneer's Preference licenses of American Personal Communications and Cox, and the license won by PhillieCo, a partnership that includes Sprint.

total of 505 million (since there are two licenses in each MTA, the total number of pops is twice that of the population of the United States). The pops won by each company are shown in Table 3.

As a result, the PCS industry will be dominated by a very small group of very large carriers, and smaller companies will have to scramble to find niche markets, whatever those may turn out to be. Yet, there is hope for them; as MCI Communications proved, it is sometimes possible for a small telecom company to grow and thrive.

Prospects for PCS

The successful bidders walked away from the auction with paper licenses after spending an aggregate of over \$7 billion. That was the easy part. Now, the tough job begins of selecting a technology, and then engineering and building a system to serve millions of customers, costing several times that amount. Once the networks are built, the fledgling PCS operators will face vigorous competition. Every point in the United States is part of a BTA (for which four PCS licenses will be issued) and part of an MTA (for which two licenses have been or are about to be issued). There will be as many as six PCS operators in any spot; there are certain to be at least three, as no operator will be permitted to acquire more than 40 MHz in any one spot, and there are 120 MHz of spectrum assigned to licensed (public) PCS.

Each carrier will attempt to snare as large a market share as possible. But there are other carriers seeking the business of mobile telephone users. The two cellular companies have been in this market for 12 years. In addition, Nextel is constructing a nationwide Specialized Mobile Radio (SMR) network, providing services virtually indistinguishable from cellular. Competition could also come from operators in a band of frequencies set aside for Interactive Video and Data Service (IVDS), which was originally designed for TV-related services such as home shopping, but which could be adapted to mobile telephony. On top of that (quite literally) are five proposed low earth orbit satellite systems, which intend to orbit satellites providing mobile telephony and other services. Thus, there could be 10 or more carriers seeking the mobile communications dollar.

With such intense competition, there is a serious question as to whether PCS can be economically viable. The most serious competition will come from the two cellular operators, and the PCS operators will try to distinguish themselves from the cellular operators. The marketing edge that PCS must have over cellular to survive will come from the combination of a lower price and more features, such as the subscriber control over incoming calls described below.

Cellular Versus PCS

The principal advantage that cellular holds over PCS in the coming vigorous competition is the fact that it is already there—a nationwide infrastructure has already been built at a cost of about \$18 billion, and the cellular industry has annual gross revenues of over \$14 billion. In contrast, the PCS operators have spent over \$7 billion just to get their licenses (which cellular operators got for free), and they still have to invest many more billions to construct their networks. The cellular industry has a distribution network in place, while the PCS operators must develop one. A final advantage that cellular enjoys is that the public is familiar with cellular phones and with the brand names of the major operators; but the PCS operators must educate the public on how PCS differs from cellular (if indeed it does), and on the brands and operational details of PCS. Only a few PCS operators, such as AT&T and Sprint, will enjoy the benefits of a widely-recognized name.

PCS Advantages

Despite these cellular advantages, the enthusiasm of the bidders for PCS licenses demonstrates that many PCS entrepreneurs believe that they can succeed in this crowded field. Indeed, PCS has a number of countervailing advantages:

- (1) Because it uses smaller cells, it can reuse its frequencies more efficiently than cellular; consequently, it will have far more capacity.
- (2) At least initially, PCS should have a significant price advantage. Cellular has a duopoly structure resulting from the FCC's decision in the early 1980s to allot just two licenses in each market. The demand for cellular has been so intense since then that, for the most part, the two carriers in each market have not found it necessary to compete on price terms. As a result, cellular prices have remained artificially high. PCS should be able to undercut these prices because of its greater capacity than cellular, and the resulting ability to spread its infrastructure costs over more customers.

PCS is using more efficient technology developed 20 years later than that used in the analog cellular network, and it may be less expensive on a per-customer basis. Market studies using simulated PCS systems have shown that there is a very strong latent demand for mobile telephone services not met by cellular, provided that the price of a call is kept to around \$0.10 to \$0.15 per minute, and the monthly premium over the standard landline phone charges is not more than \$20 to \$30. If PCS can meet these target prices, the outlook for them should be bright.

The critical question is whether cellular companies can match these prices if pushed to do so. They may well have sufficient operating margin to lower their prices to meet the PCS threat; their prices have not significantly declined for several years despite a dramatic increase in the volume of their business. However, there will probably be a window of opportunity for PCS operators to underprice cellular service before the cellular operators react. They will not want to reduce prices to their 25 million existing customers merely because of a future threat from PCS, but will wait until PCS has built up a significant subscribership and is threatening to seriously cut

into their revenues. Nevertheless, some cellular operators are experimenting with price reductions limited to a subset of their customers deemed vulnerable to poaching by PCS—those customers who use their cellular telephones within only a few miles of home. These customers are being offered lower per-minute rates close to home, coupled with higher rates when they stray beyond the hometown area.

- (3) PCS will offer customers, as a major selling point, the ability to control the handling of incoming calls. The subscriber will be able to tell the network which calls should be delivered directly, wherever he or she may be, which calls should be diverted to someone else such as a colleague, and which should be sent to voice mail. The customer's personalized service profile can be changed by the subscriber whenever desired, even several times a day. This capability will be built into the network's handling of PCS calls from the start; it is not currently available in the cellular worlds, except in certain limited trials by Bell Atlantic and some other cellular carriers. However, if cellular operators deem it necessary to meet the PCS threat, they could equip their networks to provide similar features.
- (4) Cellular was designed in the 1970s to produce a quality of sound then deemed to be "adequate"; higher-quality sound would have required the allocation of more bandwidth to each channel. In contrast, PCS is designed to provide "landline quality"; the sound produced by a PCS phone is expected to be as good as that produced by a conventional wired phone.
- (5) A further advantage—one that the cellular carriers will not easily be able to emulate—will come from the "one-stop shopping" capabilities of PCS. If the PCS operator goes into the local exchange business, it will be able to offer both local service at home and public mobile service in town, in the shopping mall, and elsewhere where their customers are likely to wander, while the cellular companies will be able to offer only high-cost mobile service (unless, of course, the cellular companies buy the 10 MHz license they are permitted to acquire and also use it for local exchange service).

Table 4
The Market for PCS and Wireless Services


Service	1993		1998		2003	
	Subscriptions (Millions)	Penetration (% of pop.)	Subscriptions (Millions)	Penetration (% of pop.)	Subscriptions (Millions)	Penetration (% of pop.)
PCS	-	-	8.5	3.0	31.0	10.4
Satellite	0.1	.04	1.3	0.5	4.0	1.4
Paging	19.0	7.0	37.0	13.0	65.0	22.0
Dedicated Data	.05	-	3.4	1.0	5.7	2.0
Cellular	13.0	5.0	33.0	12.0	52.0	17.0
SMR/ESMR	1.5	.6	5.0	2.0	9.0	3.0
Total Mobile Services	33.7	13.4	88.0	33.0	167.0	55.8

Source: Personal Communications Industry Association

Note: Because of multiple subscriptions, there are more subscriptions than subscribers. Penetration rates assume a population growth of 1.5% per year.

Potential PCS Market

All this activity presupposes that there are large numbers of customers ready to buy the new services. A comprehensive forecast of the market for PCS and other wireless services was prepared last year by the Personal Communications Industry Association (PCIA), a trade association of companies hoping to enter the PCS business, as operators or as vendors of equipment. The results are shown in Table 4.

PCIA predicts an astonishing growth in wireless communications, so that, by 2003, over half of the U.S. population will be carrying around a wireless communications device of some sort, ranging from a simple pager to a satellite go-anywhere telephone. The growth expected for PCS explains why so many companies are willing to risk their fortunes on this untried service. 

¹ Rand McNally, *1992 Commercial Atlas and Marketing Guide*, 123rd Edition.

²To encourage development of new technologies, the FCC provides preferential regulatory and licensing treatment to those who offer new and innovative telecommunications services. The standard for granting a preference under the Pioneer's program is based on the following: a significant communications innovation, to which the applicant has made a substantial contribution, which will likely lead to implementation of the innovation. R. A. Heverly, "Personal Communications Services: Policy Issues and Events," *New Telecom Quarterly*, Vol. 1, No. 2 (May 1993), p. 16.