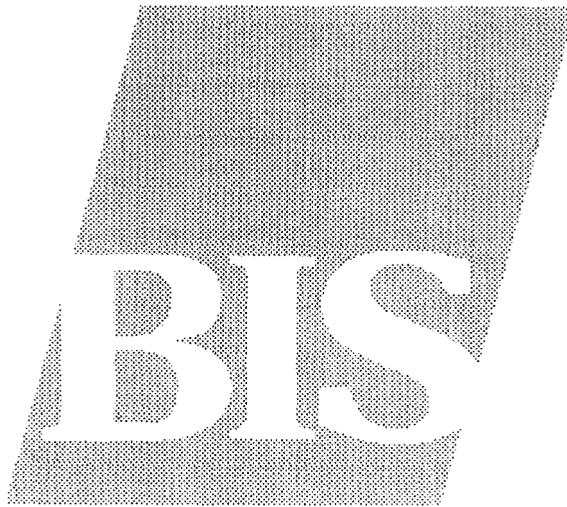


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FCC PCS Demand Predictions Panel: April 11, 1994

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Introduction

BIS Strategic Decisions is the leading global consulting and research company serving the mobile and wireless communications industry. For over 25 years, BIS Strategic Decisions has been involved in assessing the impact of emerging technologies and providing tactical and strategic support to leading terminal equipment, infrastructure equipment and service provider entities worldwide.

In the Mobile & Wireless Communications arena, BIS Strategic Decisions has unparalleled experience and expertise with a portfolio of Continuous Information Services covering North America, Europe and Asia Pacific. These Continuous Information Services provide market tracking, demand projections, technology assessment and regulatory environment monitoring across Cellular, Paging, SMR/ESMR, Mobile Data, Satellite and PCS/PCN solutions. In addition to our portfolio of Continuous Information Services, BIS Strategic Decisions has conducted a larger number of proprietary custom consulting assignments focusing on determining the timing and scale of PCS/PCN demand in the US and internationally. Additionally, BIS has assisted several leading industry participants in developing winning bids for international PCN licenses.

BIS is pleased to participate in the FCC's PCS Task Force's panel on PCS Demand Predictions. BIS Strategic Decisions has been tracking and conducting demand studies in the US since 1989. Our demand projections for PCS represent the integration of multiple research programs that include:

- Focus groups and end user studies
- Telephone interview programs with business and consumer market segments
- Regular interviews and discussions with potential service providers, infrastructure providers and terminal manufacturers

The following pages outline our assessment of the prospects for the Licensed PCS industry. BIS Strategic Decisions has been contracted to develop a demand forecast for the Unlicensed PCS industry on behalf of UTAM. The results of the demand study for Unlicensed PCS are not yet available but will be released when UTAM submits its financial plan.

Our analysis of PCS demand that follows will, therefore, focus on the Licensed PCS industry, taking into consideration major drivers of market development such as:

- Regulatory barriers and demand inhibitors
- Technological factors
- Customer requirements and segmentation
- Competitive dynamics of the PCS service supply side

PCS Market Evolution in the US

The definition of PCS has evolved significantly from its origins as a less expensive form of cellular at its inception in the UK. The earliest PCS concepts represented a trade-off of restricted coverage areas and functionality in order to provide a more affordable alternative to the cellular premium priced solution. The original PCS definitions envisioned metro only coverage in islands of covered zones within several hundred feet of telepoint base stations and providing for outbound only communication. The early failures of the four UK Telepoint operators supplemented by US research conducted by vendors and carriers has lead to a consensus that broad coverage areas and 2 way communications are critical for successful PCS deployment.

Over the last few years a new definition of PCS requirements has been emerging with a focus on the feature differentiation rather than price competition.

Potential PCS providers and their equipment vendors have been promoting a suite of advanced features for PCS that are dependent on intelligent network offerings and would, in essence, stimulate higher monthly billings than wireless POTS.

The most common advanced feature promoted for PCS is a single personal telephone number which would follow the subscriber from home, to the car, to the business and in the public domain providing the "Anytime..... Anywhere" person centric communications paradigm of the future.

The vendor and carrier industries have determined that, in an environment where customers could potentially be contactable at all times, enhanced call screening and call management features would be demanded. The ability for PCS to offer customer determined call management features such as time of day routing, default to voicemail and restricted access profiles has rapidly become firmly embedded as a critical success factor in the minds of most potential service providers. As a result of this perceived customer requirement, the complexity and intelligence required of PCS networks would increase significantly. Therefore, PCS appears to have migrated from its origins as another discrete wireless network service to an advanced communications network that is enabled by the deployment of intelligent network functionality by the LECs. There are several key factors which are driving the transformation of PCS from its original basis as a more cost effective alternative solution to cellular:

- I. The expectation that cellular carriers, with a significant lead time to prepare for new PCS competitors, will recalibrate their pricing schedules to better serve the growing numbers of marginal consumers signing on for cellular and to limit the window of opportunity for consumer oriented new services.

In essence, the expected competitive response from embedded cellular players of creating consumer oriented tariffs similar to those witnessed in the UK, has convinced many potential service providers that competition on the basis of price would not be sustainable.

- II. The proposed licensing scheme has forced PSPs to fundamentally question the attractiveness and likely returns from PCS participation.

The proposed licensing rules for PCS in their current format:

- Fail to learn from international precedent
- Provide a fragmented structure
- Encourage customer confusion & will limit Investor interest

The Ruling failed to learn from international precedent

A cursory review of the UK licensing experience would have clearly demonstrated to the FCC that 7 operators is too many. The UK initially licensed 4 Telepoint operators and three PCN operators. However, the market realities are that only 1-2 viable competitors to cellular can be supported. Therefore, an inevitable market correction occurred with all of the Telepoint licensees terminating their services and the arrival of higher functionality PCN services being seriously delayed.

The Ruling provides a fragmented structure

The ruling provides a highly fragmented marketplace with multiple licensees rather than strong competitors to cellular.

It is obvious that cellular carriers would rather have seen numerous small and weak competitors with 20 MHz or less rather than 2-3 new competitors with 40 MHz of spectrum. Cellular carriers not only saw their desire for multiple licenses granted but received an additional allocation of spectrum. The ability to compete for one of the 10 MHz blocks in BTA service areas represents the icing on the cake for cellular. Similarly, the LECs carriers were allowed to add wireless capability without seeing the basis for true competition in the local loop emerge. The ruling serves to strengthen the position of existing players and will allow them to develop low user tariff programs to preempt migration to new services. The RBOCs either via the LEC offerings or via their cellular subsidiaries with new low feature services can effectively stymie competition from all but the most determined of the new competitors.

There does not appear to be a logical basis for the four 10 MHz allocations while the mix of BTA/MTA for licensing areas appears to doom BTA licensees to niche market positions with questionable long term feasibility.

Every research report identifies broad coverage as the number one requirement for success of PCS. Inevitably, BTA limited operators will be overshadowed by larger MTA licensees or BTA operators will merge or aggregate to create larger service areas. The allocation of four 10 MHz channel blocks is questionable as no credible industry participant supported it except for unlicensed applications and secondary purposes. It would appear that the 10 MHz allocation's sole purpose was to grant additional spectrum to existing cellular operators and their RBOC parents.

Based on the proposed licensing plan, the 30 MHz allocations offer the best opportunity for long term sustainable markets in PCS.

BIS believes that the two 30 MHz allocations available in each of the 51 MTAs will be the most hotly contested but will ultimately be won by a familiar cast of participants: the RBOC or their cellular subsidiaries and the IXCs. The ability of small business and minority business to finance PCS, fulfill the build out requirements and survive in a highly crowded market with limited spectrum and coverage is highly questionable in our view. Similarly, the four 10 MHz allocation in the BTAs do not appear to hold strong long term potential except for very large well financed players.

Consequently, we believe that it is likely that not all allocations will be filled in all markets. The top 10-15 MTAs will be hotly contested but smaller markets and certainly the 10 MHz BTA slivers will prove to be unattractive to many potential service providers. Ultimately, the proposed licensing plan for PCS appears likely to create a market where RBOCs and the IXCs dominate the MTAs with cellular carriers winning 10MHz blocks within their footprints.

With seven separate allocations and multiple choices of network infrastructure (TDMA versus CDMA) in these blocks, the ability of the equipment vendor community to leverage volume factors to provide low cost terminal equipment is also questionable.

Our leading international competitors are in the process of moving towards unified single standard systems for next generation services and upgrading incompatible existing cellular services to common digital standards. The US wireless communications industry in contrast appears destined to abandon the clear benefits of uniform standards that have contributed to our success in leading the world in adoption of untethered solutions.

At this time, there is no dominant design with respect to standards selection for the US PCS market. While GSM solutions have an early lead in terms of availability and proven commercial product outside the US, potential PCS service providers have not yet made firm commitments. Based on our discussions with potential service providers, the US PCS market is likely to be characterized by a mix of incompatible systems with some carriers selecting TDMA based solutions and others favoring CDMA enabled services.

In an environment where the equipment vendor community will be forced to support multiple standards for PCS and face an extremely fragmented market with up to seven license blocks before consolidation, their ability to drive down the cost curve on terminals will be seriously impaired. An additional factor adding negative momentum to the industry will be reluctance of potential PCS service providers to commit to significant handset subsidies in order to stimulate adoption.

The most critical issues facing new entrants into the wireless communications arena will be managing the cost of customer acquisition and develop a cost structure that will enable them to compete with embedded wireless solutions.

The cellular industry has pursued a strategy of significantly discounting customer terminal investment requirements in order to stimulate the rate of adoption. This strategy made excellent sense at a time when the average customer bill was in the \$200-\$300 range and break-even on new subscribers could be achieved in a matter of a few months even with elevated commissions and activation bonuses to channel members.

However, as the market has progressed beyond early adopter high volume customers and the average monthly revenue per new subscriber has fallen, these practices have created significant pressure on profitability and extended break-even points dramatically. With an expected average monthly revenue per consumer market subscriber of approximately \$30 for PCS, subsidies in the order of \$200-\$300 for handsets are simply not practical particularly with an overcrowded service supply environment. Potential PCS providers are likely to be strongly motivated to avoid high levels of handset subsidies. Therefore, the availability of inexpensive handsets to serve the consumer market is highly questionable in first generation PCS.

The Ruling Encourages customer confusion & Will Limit Investor interest

Above all else, the ruling adds to the emerging chaos in the US market. Consumers will now be faced with potentially seven new service providers for broadband PCS, in addition to narrowband PCS operators, analog and digital cellular service options, traditional & enhanced paging, SMR and ESMR as well as unlicensed devices all clamoring for their equipment investment dollars and ongoing service revenues.

The multiplicity of licenses and the complexity of the ruling is likely to have a negative impact on the availability of capital for new service providers. The use of auctions allied

with the questionable economics of PCS except in MTA licensing will create serious misgivings in the market. Capital for small firms and those exploring the 10 MHz channels will likely be very difficult to find.

As a result, the 10 MHz allocations may only be viable for large players such as the LECs and Interexchange carriers. On balance, BIS believes that the MTA licenses will be viable competitors but that the 10 MHz BTA and 20 MHz BTA licenses will struggle unless they are aggregated into larger blocks.

PCS Services

PCS holds the potential for introduction of a diverse range of feature/functionality to both business and consumer market customers. The long term vision of mass market with "Anywhere, Anytime to Anything" communications unites the spectrum of potential PCS service providers. However, a significant gap between the short term realities of PCS and the long term vision for a mass market with "Anywhere, Anytime to Anything" communications is emerging.

Given the multiplicity of PCS licenses as currently proposed, the fragmented market composition in terms of license allocations and technology choices, and the economics of PCS, BIS believes that first generation PCS will be characterized by:

- Dominance by MTA license winners who are almost certainly going to be limited to the RBOCs and IXC's.
- Difficulty in attracting investors and meeting build out schedules for the SWMRs
- An inevitable concentration on the top 10-15 MTAs with significant difficulty in filling all allocations in all markets.
- A polarized market with PCS entrants offering feature rich solutions for wide area business customers and cellular carriers using the 10MHz allocations to roll out defensive services.

MTA Services

Winners of the PCS MTA licenses and particularly the top 10 MTAs will initially focus on the middle professional business market opportunity with consumer market packages emerging as a second stage offering.

The mobile professional segment is less price sensitive, offer higher monthly billings, lower churn and bad debt compared to the consumer/mass market. Early PCS services offered by the MTA license winners are likely to center on tapping into business accounts with an offering of a total solution consisting of more cost effective wireless voice and integrated voice and data packages. PCS MTA licensees will have to beat cellular on price and provide a richer portfolio of features. A strategy of providing more cost effective service allowing higher minutes of use per subscriber and combining data services with wireless voice in order to generate average monthly revenues per subscriber of \$45-\$50 initially appears likely.

The economics of PCS operations are, at this point, not conducive to a profitable service based on providing wireless POTS to a mass consumer market. With expected average monthly revenue per consumer market subscriber expected to be in the \$25-\$30 range and an unrealistic mandate providing for up to 7 new service providers, PCS competition on the basis of price alone does not appear feasible.

Experience to date has shown limited customer willingness to pay for advanced features (at least in the short term) that would differentiate PCS from cellular. A significant gap between the requirements and willingness to pay of the consumer segment and the technology vision of the PCS industry exists.

In order to compete in the marketplace, therefore, potential service providers will be forced either to participate in a volume driven low margin business serving commodity-like wireless voice to the mass market or focus on penetrating business accounts with integrated voice and data solutions. Given the capital intensity of the PCS industry, the daunting distribution and channel management challenges, the serious problems of churn management and the prospects for relatively low revenues/subscriber from the mass market, a concentration on higher billing, more stable business accounts is likely for first generation PCS. In markets such as Los Angeles and New York, with particularly elevated cellular pricing, newly licensed MTA providers will also quickly roll out consumer oriented packages that reduce the penalty for peak hour usage.

First generation PCS offerings from new entrants will, therefore, most likely start with deployment of full vehicular coverage in major commuter corridors into large metro areas. Second phase deployment is likely to center on expanding metro area coverage with the vision of residential neighborhood coverage being deferred to a long term third phase investment.

10MHz Allocation Services

Winners of the 10MHz PCS allocations will be dominated by the cellular carrier community who will use their new allocation primarily for cellular defense offerings.

With the exception of existing cellular carriers, the 10MHz allocations do not appear to be economically viable. The cellular carrier community is likely to use the 10MHz allocation to introduce low tier consumer oriented tariffs as a measure to retain marginal cellular customers who are typically generating average monthly revenues in the \$30-\$35 per month range and who are most vulnerable to an inexpensive PCS offering. For cellular carriers, retention of these customers and limiting the window of opportunity for new PCS entrants is perhaps more important than the profitability of new 10MHz PCS services. After all, cellular carriers have paid a premium to acquire these customers as a result of handset subsidization and activation bonuses. Every marginal cellular customer converted to a low tier 10MHz PCS offering with a long term service contract requirement represents one less available customer acquisition opportunity for new entrants.

PCS Demand Projections

BIS Strategic Decisions has developed a number of alternative demand scenarios reflecting the critical regulatory, technological and marketing enablers for PCS. Given the prevailing market, technology and regulatory environment, BIS Strategic Decisions believes that the short term prospects for PCS are best represented by the following scenario.

BIS Strategic Decisions forecasts an installed base of PCS subscribers of 17.2 million subscribers generating annual service revenues of approximately \$6.2B by the end of year 10.

PCS Subscribers and Annual Service Revenues

	Millions									
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Subscribers	0.3	0.8	1.6	2.8	4.5	6.8	9.3	11.9	14.5	17.2
Service Revenue (\$)	161	433	8,44	1,415	2,146	3,094	3,932	4,681	5,437	6,192

Business market mobile professional customers will dominate demand in the short term with a heavy concentration of subscribers and services in the top 10-15 MTAs. PCS will be positioned to target the business market with integrated voice and data solutions rather than commodity voice services. Broad consumer market adoption is not likely to emerge for several years after introduction of service when the number of remaining PCS competitors will be consolidated leaving only 2-3 viable competitors to cellular.

The average monthly revenue per subscriber will decline from \$45 in Year 1 to approximately \$30 by the end of Year 10. PCS service providers will attempt to position their serviced as feature rich, value added solutions and will be reluctant to commit to significant handset subsidization in the early years. Consequently, BIS assumes average terminal values of \$400 in Year 1 declining to \$250 by the end of Year 5 and \$150 by the end of year 10.

Conclusions

PCS represents a significant market with the potential to support 17 million subscribers by the end of year 10 even allowing for the inhibiting impact of the proposed licensing plan. The proposed two 30 MHz MTA, one 20 MHz BTA and four 10 MHz allocations do not provide the basis for a strong, sustainable PCS market.

In its current format, PCS will not realize its full potential on a timely basis, and most importantly, the public will not be best served with a diverse range of cost effective products and services. A more rational licensing plan for PCS which acknowledges the economic realities of the market and supports only 2-3 strong MTA licensees would create a more competitive environment in which both the timing and scale of the consumer market and the total market served by wireless solutions would be enhanced.