

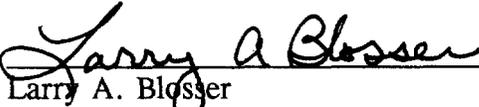
Renewal. The renewal expectancy accruing to PCS auction winners should be even higher than that currently granted to cellular incumbents. See PCS Order at ¶¶ 130-31. Given the cloud over the cellular renewal expectancy, and the significant investment which must be made in the case of PCS, PCS should have an even stronger renewal expectancy than cellular has. As a general rule, the auction-winning license will have made a significantly higher investment (since the cellular incumbent won a lottery to originally obtain its license) and with that greater investment should come a greater renewal expectancy.

VIII. CONCLUSION

WHEREFORE, MCI requests that the Commission take these comments into account in the development of rules for the use of competitive bidding in the licensing process.

Respectfully submitted,

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Dated: November 10, 1993

**DESIGNING PCS AUCTION RULES
TO ENCOURAGE COMPETITION**

Prepared for

MCI Telecommunications Corporation

by

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Hatfield Associates, Inc.

November 10, 1993

EXECUTIVE SUMMARY

The Commission faces sometimes conflicting objectives in designing spectrum auction rules. This paper concludes that among the goals of allocative economic efficiency, competition and revenue maximization, the Commission should place primary emphasis on the goal of competition. In the long run, competition will promote allocative efficiency in PCS markets. While some short term revenue benefits to the Treasury may be lost if competition is promoted, these losses are likely to be overshadowed by the long term social welfare benefits of competition.

Three spectrum auction design policy instruments are evaluated: eligibility requirements, auction methods and collusion rules. The existing nationwide structure of the cellular industry is dominated by nine carriers -- AT&T/McCaw, the seven RBOCs and GTE/Contel. Absent further eligibility requirements, these carriers are likely to win the lion's share of the spectrum being allocated through auctions. Competition and innovation in the PCS and related markets will be enhanced if new players enter the industry. Excluding dominant cellular carriers from one of the 30MHz PCS bands will accomplish this objective.

The Commission favors oral ascending bid auctions over sealed bid auctions. By providing information about the intentions of their strategic competitors, oral auctions will facilitate cellular carrier dominance of PCS spectrum. Therefore, for those licenses for which cellular carriers are eligible to bid, the identity of the bidders should not be revealed to other participants. Electronic bidding, provision for multiple bidding agents or sealed bids will accomplish this result and therefore promote competition and diversity.

DESIGNING PCS AUCTION RULES TO ENCOURAGE COMPETITION

I have been asked by MCI Telecommunications Corporation (MCI) to address economic issues raised by the Commission's Competitive Bidding Notice of Proposed Rulemaking (NPRM).¹ Three questions are considered. First, should eligibility restrictions in addition to those contained in the PCS Rules be implemented in order to "...promote competition by avoiding concentration of licenses"?² Second, which of the several proposed bidding mechanisms would best promote the Commission's goals in this Proceeding? Finally, are restrictions against collusion necessary? The paper begins by providing an overall policy framework within which eligibility, auction design and collusion rules can be evaluated.

I. PUBLIC POLICY TRADEOFFS IN SPECTRUM AUCTION DESIGN

The Commission faces several tradeoffs in designing spectrum auctions. For example, as discussed below, auction mechanisms designed to maximize revenue may be inconsistent with the development of a competitive PCS market. Policy tradeoffs such as this can be analyzed with a targets and instruments framework.³

¹ Implementation of Section 309(j) of the Communications Act, PP Docket No. 93-253, October 12, 1993. ("NPRM") A copy of my resume is attached.

² See NPRM, paragraph 81.

³ Bent Hansen describes a formal targets and instruments model in The Economic Theory of Fiscal Policy, (1958), pp. 3-29.

A. POLICY TARGETS

There are three readily identifiable policy targets involved in PCS spectrum policy: spectrum economic efficiency, competition and revenue maximization:⁴

Spectrum Economic Efficiency. This goal has motivated spectrum allocation reform proposals advanced by economists.⁵ In principle, auctions allow scarce spectrum resources to flow to entrepreneurs who place the highest value on the spectrum. In this way, the economic goal of static allocative efficiency is promoted.

Competition. An overall objective of creating PCS and licensing individual companies to provide the service is to stimulate competition in telecommunications markets. The competition issue arises at several levels. The Commission would like both a competitive auction market and competitive service markets. With regard to the latter, there are three issues to consider: competition within the PCS service; competition within a broader set of wireless services, and competition between wireless and landline telecommunications services.

Revenue Enhancement. One of the benefits of spectrum auctions is the revenues from the sale of scarce spectrum that will be generated for the Treasury.⁶ In the past, the scarcity rents have flowed to licensees rather than to the public. The current federal budget deficit has been cited as an additional rationale for auctioning spectrum.

B. POLICY INSTRUMENTS

The Commission is considering several policy instruments in the NPRM, including eligibility requirements, auction methods and collusion rules:

⁴ Diversity in terms of minority participation in PCS is also a public policy objective that can be evaluated with a targets and instruments approach. However, I do not deal with those issues here.

⁵ Doug Webbink, Frequency Spectrum Deregulation Alternatives, Office of Plans and Policy Working Paper No. 2, Federal Communications Commission, October 1980 and Evan Kwerel and Lex Felker, Using Auctions to Select FCC Licensees, Office of Plans and Policy Working Paper No. 16, Federal Communications Commission, May 1985.

⁶ Revenue maximization is not required by the legislation authorizing spectrum auctions. See NPRM, paragraph 14.

Eligibility Requirements. The number and geographic scope of licenses was established in the PCS Order. These decisions will obviously have an impact on efficiency, competition and auction revenues. The Commission has also made some initial decisions concerning ownership eligibility for spectrum. In particular, cellular carriers are restricted from acquiring spectrum in their own territory. However, the NPRM asks whether additional qualifications are appropriate. Therefore, additional eligibility requirements are a policy instrument to be considered here.

Auction Methods. As noted in the NPRM, "there are four basic auction methods: oral ascending bid (English), sealed bid, descending bid (Dutch) and sealed second-bid (Vickrey)."⁷ There are also a number of additional spectrum auction procedure issues that could affect outcomes. For example, the sequence under which licenses are auctioned could affect the outcome.⁸

Collusion Rules. The Commission has asked what rules, if any, might be necessary to limit the possibility of collusion in spectrum auctions.

Eligibility requirements, auction methods and procedures and collusion rules will directly affect economic efficiency, competition and revenue maximization. The nature of the tradeoffs involved will be discussed next, followed by discussions of the eligibility requirements, auction methods, and collusion.

C. TRADEOFFS AMONG GOALS

Each of the three goals is discussed below. But some general results can be summarized here. First, some outcomes are clearly dominated by others. For example, selecting policy instruments that result in low revenues to the government and little competition (perhaps due to collusion in both the spectrum market and the final or PCS market) is clearly an inferior result to an outcome that involves maximum possible competition, regardless of the revenue impact. An outcome that involves high auction revenues and reduced competi-

⁷ NPRM, p. 13.

⁸ See, NPRM, paragraphs 51-56.

tion presents a more difficult issue, but as discussed below, is likely to be dominated from an overall public welfare point of view by a result that allows more competition, even at the cost of auction revenues.

At first glance, it would seem that the economic efficiency issue is straightforward -- the Commission should design a spectrum bidding mechanism that will maximize the opportunity for the highest bidder to obtain the spectrum.⁹ However, the issue is more complicated. The traditional model that suggests that markets, including spectrum auction markets, should allow the economic good in question to go to the highest bidder in order to maximize static allocative efficiency does not necessarily apply here.

If there are many bidders vying for resources to be used in producing goods in a competitive market, then the government can safely assume that allowing the goods to go to the highest bidder will likely maximize economic efficiency. The most efficient supplier at any one time will purchase the good being auctioned in the amount needed. This model likely characterizes auctions of government-owned natural resources or Treasury security auctions.

The problem becomes more complicated if market power is involved. To take an extreme example, if only one unit of an essential input is auctioned, the winner will have market power. Absent regulation, monopoly prices will be charged in the final good market. Instead of allocative efficiency, there will be a welfare loss. This explains why bid mecha-

⁹ From the standpoint of maximizing economic efficiency, markets would be used not only to select licensees for particular services, but also to determine the specific services for which the spectrum would be used. See Webbink, Frequency Spectrum Deregulation Alternatives, *supra*, note 5, pp. 23-29.

nisms for scarce essential inputs, for example a monopoly franchise, do not necessarily focus on generating maximum revenue for the government. Instead, bids are based on price and quality of the service that will be provided.¹⁰

In general, competition and allocative efficiency are consistent goals. That is, steps taken to promote one will also promote the other.¹¹ However, as the discussion of economic efficiency suggests, revenues may be maximized if competition is limited since the bidders will be willing to transfer the monopoly profits to the spectrum owner.¹² How should the Commission evaluate this tradeoff?

The benefits of increased competition are likely to dominate the revenue maximization goal. The public benefits from competition can be enormous. For example, Evan Kwerel and John Williams found that an additional competitor in the cellular business in the Los Angeles market alone "...would likely increase social welfare by over one billion dollars."¹³ Dynamic effects could be even greater. The revenues of the local exchange carriers exceed 80 billion dollars. If PCS is deployed in a way that provides competition to the monopoly local exchange, consumer benefits could obviously be quite large.

¹⁰ See Richard Schmalensee, The Control of Natural Monopolies, 1979, pp. 68-72 for a discussion of franchise bidding.

¹¹ Technical efficiency may be inconsistent with having a large number of licenses, each with a limited amount of spectrum.

¹² See Jean Tirole, The Theory of Industrial Organization, 1989, pp. 76-78, and Richard Posner, "The Social Costs of Monopoly and Regulation," Journal of Political Economy, 1975, pp. 812-820, for an analysis of rent seeking behavior.

¹³ Changing Channels: Voluntary Reallocation of UHF Television Spectrum, OPP Working Paper No. 27, November 1992, p. vii.

On the other side of the cost benefit equation, spectrum fees from auctions will produce a one time payment to the Treasury. In fiscal year 1993, the federal budget deficit was 255 billion dollars. A one time reduction of ten billion dollars would be less than four percent of last year's deficit. But designing auctions to maximize competition is not likely to drive auction revenues to zero. Only a percentage of the expected revenues is at stake if the Commission structures auctions to maximize the opportunity for competition. Thus, an auction structured to maximize competition would likely benefit Americans more as consumers than an auction structured to maximize revenues would benefit Americans as taxpayers. In other words, any small benefit to taxpayers through reduction of the deficit would be more than offset by competitive harm to consumers, who are the same taxpayers.¹⁴

It is, of course, the Commission's responsibility to balance these sometimes conflicting goals. However, it appears that the adoption of spectrum auction policy instruments that are likely to maximize competition should be favored.

II. WHAT ELIGIBILITY RULES WILL MAXIMIZE COMPETITION?

As discussed above, the goal of maximizing competition likely dominates other possible PCS goals. Eligibility requirements can be used to maximize the potential for PCS competition. The nature of PCS competition is discussed first followed by a discussion of eligibility rules appropriate to maximize the potential for that competition.

¹⁴ If spectrum payments are low due to collusion among bidders, that of course would represent a net reduction in social welfare. Collusion is discussed below.

A. PCS COMPETITION

There are many potential economic markets in which PCS may compete. PCS may evolve as a separate and distinct service from the existing cellular service, as a direct substitute for cellular, or as a substitute for local loops. The ability of the service to realize the latter two alternatives is likely a function of the amount of spectrum granted.¹⁵

Therefore, the answer to the question "how can competition be maximized?" is not an easy one. Competition within local PCS markets will obviously be maximized if the bidding rules prevent consolidation of directly competing bands. Cellular is not a competitive service.¹⁶ But the technology has the potential to compete and therefore cross-ownership of cellular and PCS should not be allowed. Finally, PCS can compete with elements of the local exchange network and therefore LECs should not be allowed to dominate PCS spectrum.

The Commission has already decided that multiple local PCS "franchises" will be auctioned. However, the resulting market for PCS will not be perfectly competitive. There will be at most seven broadband or 2 GHz PCS licensees. Only two of those licensees will begin with 30 MHz blocks of spectrum. The ability of the others to be full service PCS

¹⁵ These issues are discussed at greater length in Daniel Kelley, "An Efficient Market Structure for Personal Communications Services," September 13, 1993. (Filed in General Docket No. 90-314)

¹⁶ *Id.*, pp. 6-19.

suppliers or to compete with existing entrenched cellular carriers may be limited due to the small amount of spectrum allocated to them.¹⁷

B. ELIGIBILITY RULES¹⁸

As noted earlier, the Commission has partially addressed the competitive issue by restricting direct cross-ownership among PCS and cellular franchisees in the same territory. The existing rules do not adequately recognize the importance of the nationwide structure of the PCS market. The following discussion shows that unless the Commission takes steps to insure diversity, the existing cellular carriers are likely to dominate PCS auctions. The resulting negative effects on innovation and competition are discussed next. The conclusion is that a significant amount of spectrum should be auctioned to new entrants into the wireless and local telephone industries.

1. Cellular Carriers and LECs are likely to Dominate PCS Auctions

The existing cellular carriers have the incentive and ability to acquire substantial amounts of PCS spectrum. Although cellular markets are local, the MobiLink consortium and AT&T/McCaw are forming national brands for marketing purposes.¹⁹ By bidding on and winning new PCS licenses, the existing firms can block the formation of new national

¹⁷ The Commission will consider consolidations among licensees to allow efficiencies to be gained. However, the transactions costs and delays involved in achieving such consolidations will limit their competitive effectiveness. See Stan Besen, An Economic Analysis of the Cellular Radio Headstart Issue, December 20, 1982.

¹⁸ Some of the material in this section is excerpted from, "An Efficient Market Structure for Personal Communications Services," *supra*, note 15.

¹⁹ As reported in the Wall Street Journal, "MobiLink service will compete against another North American alliance spearheaded by McCaw Cellular Communications Inc. and Southwestern Bell Corp." See Mary Lu Carnevale, "Cellular Phone Companies Agree to Set Common Standards for North America," February 19, 1993, p. B2.

"brands" that would compete. This, in turn, will help protect their existing cellular cash flows since new entrants would not have the same access to this marketing vehicle.

These carriers can afford to spend a lot of money to protect their dominant positions. Data showing rate of return on investment for cellular carriers are not available. However, other evidence suggests that the cellular business is very profitable. Analyst reports show that cellular firm cash flow margins have been consistently positive, with some as high as 50 percent. More significantly, operating cash flows across a broad spectrum of cellular companies have been increasing over time.²⁰

The Office of Plans and Policy study cited earlier found that entry by a third cellular carrier in the Los Angeles market using UHF television spectrum would lead to a 25 percent reduction in prices. At the post-entry price level, the study estimates that the new entrant would still earn substantial profits.²¹ This result is possible only if the existing firms are, to say the least, highly profitable.

Another reason to expect existing cellular carriers and non-cellular LECs to win the lion's share of PCS licenses is that they have ready access to low cost capital.²² Any firm contemplating a bid for PCS spectrum will make a series of financial calculations. Although many assumptions must go into these calculations, a critical component of the analysis is the

²⁰ See Linda J. Runyon, The Cellular Industry: Initiating Coverage, Morgan Stanley, January 7, 1993, p. 17.

²¹ Kwerel and Williams, *supra* note 13, p. 86.

²² Economics and Technology, Inc. point out that "...an examination of the depreciation, earnings, dividend payments, and reinvestment practices of the Regional Bells and their various regulated and non-regulated subsidiaries reveals a general pattern of diversion of capital away from the regulated entities and into the non-regulated business." Patterns of Investment by the Regional Bell Holding Companies, May, 1993, p. 1 [emphasis in original].

firm's "hurdle rate" or the minimum expected return it requires to make the investment. This hurdle rate is in turn a function of the cost of capital and the risk that the firm anticipates.

The lower a firm's hurdle rate, the more it will be willing to bid for a license. The intuitive explanation is that, the lower the cost of capital, the more a firm can pay for an asset and still satisfy its internal hurdle rate. For example, a five percent difference in hurdle rates could result in a doubling of the amount a carrier would be willing to bid on a license.

The old "conventional wisdom" in economics is that efficient capital markets ensure that entrants receive financing necessary to exploit profitable market opportunities. However, modern economic analysis recognizes that capital markets may fail under a variety of plausible circumstances.²³ The nine largest cellular carriers are affiliates of the Regional Bell Operating Companies, GTE and AT&T/McCaw (assuming the AT&T/McCaw transaction is finalized). These large firms can be expected to have easier access to capital than most other PCS bidders.²⁴

2. The Nationwide Structure of the Wireless Industry Matters

The Commission should be concerned about domination of PCS by the existing cellular and telephone industries because the nationwide structure of the market matters.

²³ See, Janusz A. Ordover and Garth Saloner, "Predation, Monopolization, and Antitrust," in Richard Schmalensee and Robert D. Willig, eds., Handbook of Industrial Organization, 1989, pp. 548-550.

²⁴ These firms all have excellent debt ratings.

There are a number of benefits associated with a less concentrated combined cellular/PCS nationwide industry structure. Wireless technologies are relatively new and technologically dynamic. The business is subject to many types of equipment and service innovation. Therefore, new market participants provide a greater potential for diversity in marketing strategies, pricing, service options and equipment choices. With a smaller number of carriers, market experimentation will tend to be reduced. Even though firms with licenses in several markets may attempt different strategies across those markets, diversity and market experimentation are more likely if licensees are making independent marketing and technology choices.²⁵ To be more specific, a PCS supplier that is not also a cellular carrier is more likely to try new approaches and "rock the boat" than is a PCS supplier that is also a large cellular company.

This is particularly true since many of the existing cellular carriers are cooperating extensively with one another to develop technology and services:

Invoking antitrust protections under the National Cooperative Research Act, GTE Mobile Communications Service Corp. has filed notice of planned cooperative research to develop a new wireless data transmission technology. Joining it in the research project are Ameritech Mobile Communications, Inc.; Bell Atlantic Mobile systems; McCaw Cellular Communications, Inc., NYNEX Mobile Communications Co.; PacTel Cellular; and Southwestern Bell Mobile Systems, Inc.²⁶

²⁵ As Richard Nelson points out, "...differences in perception as to what are the best bets will have a greater chance to surface and be made effective in terms of diversity of R&D projects in a competitive regime than in a monopolized one." See "Assessing Private Enterprise: An Exegesis of Tangled Doctrine," Bell Journal of Economics, Spring 1981, p. 108.

²⁶ See "GTE Mobile, Six Other Firms Plan Wireless Data Technology," Telecommunications Reports, May 10, 1993, p. 41.

The cellular carriers work closely together in various CTIA groups and have jointly developed the IS-41 signalling network. Finally, Bell Atlantic, BellSouth, Pacific Bell and US West are among a group of firms that just recently formed the PCS Technology Advocacy Group "...to help advance technical standards and open interfaces for personal communications service systems."²⁷ The RBOCs work together through BellCore to develop wireless technology and with USTA to develop and advocate public policy positions.

Although the Commission declined to establish national PCS licenses, it has recognized that aggregations of bids into such licenses should not be discouraged. By allowing existing cellular carriers to bid for all licenses, there is a high probability that an efficient firm or consortium built out of individual licenses will not be formed. This is because the existing cellular and local exchange carriers have a tremendous incentive and ability to prevent these licenses from being consolidated. They can act on that incentive by outbidding their rivals for key pieces of spectrum.

A final factor to consider is that firms that meet each other in many markets may be less inclined to compete aggressively with each other in specific markets.²⁸ A cellular carrier with a PCS license in a particular geographic region will likely be facing a cellular carrier with whom it competes in its local exchange telephone territory. The resulting mutual interdependence raises the cost of aggressive price competition in individual markets.

²⁷ "Industry News," Telecommunications Reports, November 1, 1993, p. 44.

²⁸ See Jean Tirole, The Theory of Industrial Organization, *supra*, note 12, p. 243 and p. 251, for a discussion of multimarket contact as a factor that facilitates tacit collusion.

Thus, setting aside at least one piece of PCS spectrum from which the dominant cellular companies are excluded will ensure a more diverse nationwide structure for the wireless industry, with attendant benefits for competition and innovation.

III. WHAT AUCTION DESIGN RULES WILL MAXIMIZE COMPETITION?

The NPRM identifies four basic types of auction: oral ascending bid (English), sealed bid, descending bid (Dutch) and sealed second bid (Vickrey). The NPRM expresses a tentative preference for English oral auctions over sealed bid auctions. Four advantages and one disadvantage of the English method are discussed in the NPRM. Each of these is discussed below.

The relative benefits of oral auctions may not be as great as the Commission believes. Moreover, simple oral auctions will facilitate acquisition of spectrum by the existing cellular carriers, with the negative consequences for the nationwide structure of the industry discussed above. Electronic bidding, provision for multiple bidding agents or sealed bids will make this more difficult and therefore promote competition and diversity.

The first benefit of oral bidding cited by the Commission is that the bidder with the highest willingness to pay will win. As discussed in the previous section, this is not necessarily a benefit from the point of view of overall welfare maximization. A high willingness to pay may reflect rent seeking behavior designed to acquire or to protect an existing dominant position. The information supplied in an oral auction may actually facilitate this result.²⁹

²⁹ This point is discussed in more detail below.

In any event, the Commission's conclusion that oral bids will generate greater revenue is based on an assumption that there is a "common value" for the item being auctioned.³⁰ Common value bidding occurs when the item being sold has an underlying intrinsic worth. Individual bidders, based on the information they have, make assessments of what the true market price should be. Examples of common value products are timber rights and Treasury securities, while fine art auctions are based on "private values."

At first blush, it would seem that PCS is a common value situation. However, unlike timber or Treasury bills, there is not an existing PCS service. Therefore, individual firm assessments are likely to diverge widely depending on the technology they intend to deploy, the markets they intend to pursue, and the assumptions they make about consumer demand. In other words, the information divulged through the oral auction may not be as valuable to the participants as information conveyed in a true common value auction. Thus, PCS auctions may perform more like private value than common value auctions. Economic models show that oral and sealed bidding will produce equivalent bids under private value auctions.³¹

As Robert G. Hansen points out, in auction theory "...there is at least one model...to support any position one would care to take concerning the revenue of sealed-bid vs. open

³⁰ The advantages of open bidding for common value auctions are discussed in Jerry Hausman and Donald Wittman, Analysis and Recommendations for FCC PCS Spectrum Auctions, PacTel Corporation White Paper, September 13, 1993. Hausman and Wittman do not address the strategic issues raised here.

³¹ See R. Preston McAfee and John McMillan, "Auctions and Bidding," Journal of Economic Literature, June 1987, pp. 699-738, for a survey of auction theory, including proof of the revenue equivalence theorem.

auctions...."³² Hansen's survey of the empirical literature led him to conclude "that anyone with strong revenue equivalence priors should not be shaken."³³ Therefore, even if there is an advantage for oral auctions on this score, it may not be significant.

Second, the Commission believes that license aggregation will be easier under oral bidding. This is because bidders who value a particular license highly because it is essential to their aggregation plans will be able to obtain that license with greater certainty. However, as discussed above, absent further eligibility rules, the existing dominant cellular carriers have an incentive to prevent competitors from assembling nationwide licenses. For those licenses for which cellular carriers are allowed to bid, oral bidding will help the incumbents prevent non-cellular bidders from aggregating territory to form a national license. This point is discussed in greater detail below.

The third advantage cited for oral auctions is that the social costs of auctions may be reduced because individual bidders do not have to estimate the value that other bidders place on the item. Stated alternatively, oral auctions give bidders useful information about the value others place on the item. As noted above, given the large degree of uncertainty over PCS technology and the widely diverging views of potential market participants, it is not clear how valuable this information will be to individual companies. The advantage to the government of allowing this information to be observed during the auction is that higher bids

³² See "Empirical Testing of Auction Theory," American Economic Review, May 1985, p. 156.

³³ *Id.*, p. 157.

will be induced. However, as the Commission notes, the second bid sealed auction also has desirable properties to induce firms to bid their full valuation.³⁴

The Commission notes that second-bid sealed auctions may not be widely used because they "...may reveal a large gap between the amount the winning bidder is willing to pay and what is actually paid."³⁵ Results of cellular radio bidding in New Zealand are cited. The New Zealand auction market was quite "thin." The U.S. auction market is likely to be much more robust. Therefore, this result is unlikely.³⁶

The final advantage cited for oral bidding is that it may be perceived as "fair" because "...any eligible and qualified bidder who is willing to pay enough can be assured of winning."³⁷ However, as another observer has noted, "the American tradition of equal access mandates that auctions be open to all interested parties."³⁸ Sealed bidding would seem to be more accessible to small companies than participating in a centralized oral auction.

³⁴ NPRM, paragraph 44.

³⁵ NPRM, paragraph 45.

³⁶ As Milton Mueller points out, "...the differences between New Zealand and the U.S. would tend to make bidding for licenses work better in the U.S. than in New Zealand. There would be a far larger number of bidders in the market; hence the auction results would more closely approximate competitive conditions. The likelihood that the pricing anomalies experienced in New Zealand would occur in the U.S. is virtually nil." See Reform of Spectrum Management: Lessons from New Zealand, November 1991, p. 34.

³⁷ NPRM, paragraph 37.

³⁸ Vincent Reinhart, Theory and Evidence on Reform of the Treasury's Auction Procedures, Federal Reserve Board, March 1992, pp. 28-29.

The major disadvantage of oral bidding cited by the Commission is that it is subject to manipulation, i.e., collusion. As noted earlier, the dominant positions of entrenched telecommunications players may be threatened by independent PCS providers. Moreover, these dominant suppliers have tremendous financial resources. Therefore, oral bids will allow the established carriers as a group to ensure that bidders who may be trying to obtain key licenses are unable to do so, at least without raising their costs substantially.

The existing dominant cellular carriers have established a common working relationship through CTIA and have divided into two groups for purposes of providing nationwide "brand names" and interoperability.³⁹ If a well organized and technologically competent player establishes a third such network, the value of the existing franchises will be reduced. Thus, in evaluating the bids of other players, a member of the existing cellular industry has a greater incentive to raise the bid when the current high bidder is a company that has announced intentions of competing vigorously against the entrenched wireless players. This result does not require explicit collusion, only a well recognized sense of interdependence with the other players in the industry.⁴⁰ Sealed bidding would preclude this strategy.

To my knowledge, the economic literature on auctions has not dealt with these oligopoly issues. The articles that have analyzed collusion have done so from the perspective of groups or "rings" trying to pay the seller too little for valuable resources rather than from

³⁹ *Supra*, note 19.

⁴⁰ The modern literature on Game Theory shows how companies can learn to exploit their interdependence without explicit collusion of the type that would violate Section 1 of the Sherman Act, as currently enforced. See Avinash K. Dixit and Barry J. Nalebuff, Thinking Strategically, 1991, for a discussion of the application of the tools of game theory to business decisions.

the point of view of firms with entrenched dominant positions to protect attempting to deny new entrants access to critical resources.⁴¹

Another approach to this issue is from the perspective of the role of information in markets. However, it is well recognized that in oligopoly markets, information dissemination can actually reduce social welfare. Carl Shapiro points out that "the exchange of information among oligopolists has long been treated with suspicion by antitrust authorities."⁴² In competitive markets, information dissemination is usually good because it reduces uncertainty and increases economic welfare. This is consistent with the conclusion that in common value oral auctions, the added information enhances welfare.

Thus, it appears that the relative merits of oral auctions and sealed bids are not as clear cut as the NPRM suggests. Electronic bidding to disguise the identity of the bidder could solve the strategic bidding problem discussed above while still allowing an ascending bid oral auction.⁴³ Allowing firms to employ multiple bidding agents might also help in this regard.

IV. ARE COLLUSION RULES NECESSARY?

Explicit bid rigging or market sharing agreements among competitors would seem to be covered by the antitrust laws. Therefore, additional Commission Rules would seem to be

⁴¹ See, for example, Daniel A. Graham and Robert C. Marshall, "Collusive Bidder Behavior at Single-Object Second-Price and English Auctions," Journal of Political Economy, 1987, pp. 1217-1239.

⁴² "Exchange of Cost Information in Oligopoly," Review of Economic Studies, 1986, p. 433.

⁴³ The logistics involved in establishing such a mechanism may cause unacceptable delay.

unnecessary. The tacit collusion problems discussed in the previous section are difficult to address through antitrust enforcement. The best way to deal with those issues is through the eligibility and bid mechanism suggestions made above.

Aggregation of independent bidders into groups would not ordinarily be thought of as collusive behavior. The analogy is to merger enforcement. Firms are generally allowed to consolidate their operations to enhance efficiency as long as by doing so the remaining market has a sufficient number of players to be competitive. Therefore, the Commission should allow firms to join together for purposes of bidding for PCS licenses as long as there are likely to be a sufficient number of bidders to ensure a competitive outcome.⁴⁴

⁴⁴ Jerry Hausman and Donald Wittam believe that "...given the high degree of interest in PCS found in the number of applications for Pioneer Preference awards and the number of firms participating in filing comments, we expect the number of bidders to be very large." See Analysis and Recommendations for FCC PCS Spectrum Auctions, *supra*, note 30, p.6.

Resume of Daniel Kelley

PROFESSIONAL EXPERIENCE:

Senior Vice President, Hatfield Associates, Boulder Colorado (current position).

Conducting economic and applied policy analysis of domestic and international telecommunications public policy and business issues. Recent projects have included advising Central and Eastern European and Latin American Governments on privatization and competition matters and analyzing competitive conditions in cellular radio markets.

Director of Regulatory Policy, MCI Communications Corporation, 1984-1990.

Responsible for developing and implementing MCI's public policy positions on issues such as dominant carrier regulation, Open Network Architecture, accounting separations and Bell Operating Company line of business restrictions. Also managed an interdisciplinary group of economists, engineers and lawyers engaged in analyzing AT&T and local telephone company tariffs.

Senior Economist and Project Manager, ICF Incorporated, 1982-1984.

Telecommunications and antitrust projects included: forecasting long distance telephone rates; analysis of the competitive effects of AT&T's long distance rate structures; a study of optimal firm size for cellular radio markets; analysis of the FCC's Financial Interest and Syndication Rules, and competitive analysis of mergers and acquisitions in a variety of industries.

Senior Economist, Federal Communications Commission, 1979-1982.

Served as Special Assistant to the Chairman. Advised the Chairman on proposed regulatory changes in the broadcasting, cable television and telephone industries; analyzed legislation and drafted Congressional testimony. Coordinated Bureau And Office efforts on major common carrier matters such as the Second Computer Inquiry and the Competitive Carrier Rulemaking. Also held Senior Economist positions in the Office of Plans and Policy and the Common Carrier Bureau.

Staff Economist, U.S. Department of Justice, 1972-1979.

Analyzed proposals for restructuring the Bell System as a member of the economic staff of U.S. v. AT&T; investigated the competitive effects of mergers and business practices in a wide variety of industries.

EDUCATION:

1976	Ph.D. in Economics	University of Oregon
1971	M.A. in Economics	University of Oregon
1969	B.A. in Economics	University of Colorado

PUBLICATIONS AND COMPLETED RESEARCH:

"A General Approach to Local Exchange Carrier Pricing and Interconnection Issues," Telecommunications Policy Research Conference, Solomons, Md., (1992).

"Gigabit Networks: Is Access a Problem?" IEE Gigabit Networking Workshop (1992).

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