imposed solely on cellular carriers, deprives them of the flexibility they need to respond to new entrants in the CMRS marketplace. The distorting effects of price regulation are likely to be greatest in industries such as CMRS that are characterized by rapid growth, technological change, and relatively high risk.[122/]

The adoption of price regulation for CMRS providers, which generally have not been subject to such regulation, would also impose expensive and time-consuming cost allocation and jurisdictional separations requirements on them. No cost allocation or separations procedures or studies have been conducted by these providers, and their rates have been established on the basis of market determinations rather than government-set formulas.[123/] Under these circumstances, the rates for interconnection would reflect artificially-established "costs" that would encourage the kind of inefficiencies described above.

Finally, the unbundling ordered by the CPUC in the Interim Order[124/] is far from clear, far from final, and will surely be the subject of extensive further implementation problems even

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122/ Owen Declaration at ¶ 110.

123/ The principal costs associated with direct interconnection facilities are (1) lease costs for the copper or fiber facility; (2) operations, administration and maintenance costs; and (3) port costs on switches to make the connections. These costs can be shared or recovered in any number of ways; each of these costs could conceivably be recovered using a different formula, adding to the complexity of any rate regulation scheme. One formula may make sense for small carriers or when traffic volumes are relatively low, while another makes sense for bigger carriers. For instance, expressing costs per minute might be good for small carriers or relatively low traffic volumes, while sharing recurring costs on a fixed basis might be preferable in the case of larger carriers or higher traffic volumes.

124/ See § IIC.1, supra.

if authorized by the Commission.[125/] Given these uncertainties, it is highly unlikely that these new aspects of the CPUC's proposed regulatory scheme can be implemented within the 18 month period for which it seeks authority to regulate.[126/] In the meantime, the CPUC would still be left to continue its proven ineffective regulations. This regulatory program has failed to produce industry performance measures that differ significantly from any other state, including those where there has been no regulation at all.

In short, the CPUC requests authority to do the impossible. If its program cannot be implemented quickly, then the request for only 18 months of authority is merely the camel's nose under the tent, and the CPUC will again appear before the Commission seeking an extension of that authority. In fact, the ambitious regulatory program recently adopted by the CPUC cannot be implemented during the 18 months. For the reasons stated above, the Commission should reject the CPUC's request for authority to implement it at all.

125/ For instance, the CPUC has not yet determined the technical nature of interconnection with reseller switches that will be required, leaving this critical question for review when resellers propose a form of interconnection which they believe will no affect the efficiency or reliability of cellular networks in California. Furthermore, the proper procedures for pricing of unbundled wholesale service components are not established, and the establishment of jurisdictional separations procedures necessary to isolate the California intrastate rate base of cellular carriers has not yet commenced.

126/ For example, under the CPUC's Interim Opinion a cellular reseller must obtain a modified Certificate of Public Convenience and Necessity before it could implement a switch facility. This process must be completed (including any required evidentiary hearings) before a cellular carrier is to file a tariff unbundling its existing wholesale service. If the reseller protests the unbundled tariff, additional evidentiary hearings will be required under California law before the CPUC can prescribe any changes to the tariff. When applicable procedural timeframes are considered, it would be next to impossible for unbundled wholesale tariffs to become effective within the 18 month period of regulatory authority sought by the California Petition, given the litigious history of the resellers.

Conclusion

The Commission should deny the CPUC's request for rate regulation authority. The CPUC has failed to satisfy the statutory prerequisites to the grant of such authority, and its analysis of the cellular marketplace if fundamentally flawed. The CPUC is unable to establish that its proposed regulatory program will yield any benefits for the people of California.

Respectfully submitted,

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September 19, 1994
D31542.2

EXHIBIT A

BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION

In the Matter of Implementation of Sections 3(n) and 332 of the Communications Act: Regulatory Treatment of Mobile Services	}	GN Docket No. 93-252

Declaration of Bruce M. Owen on the California Petition

I. Qualifications

1. I am an economist and president of Economists Incorporated, an economic consulting firm located at 1233 20th Street, N.W., Washington, D.C. 20036. I am also a visiting professor of economics at Stanford University's Washington, D.C. campus. I hold a Ph.D. in economics from Stanford University (1970) and a B.A. in economics from Williams College (1965). My fields of specialization are applied microeconomics and industrial organization, especially antitrust economics and regulation of industry. I have published a number of books and articles in these fields, including "*United States v. AT&T*: The Economic Issues" (with R. Noll, in J. Kwoka and L. White, eds., *The Antitrust Revolution*, Scott, Foresman, 2nd ed., 1994), *Video Economics* (with S. Wildman, Harvard University Press, 1992), and *The Regulation Game* (with R. Braeutigam, Ballinger, 1978). I have taught economics as a full-time member of the faculties of Duke University and Stanford University. From 1979 to 1981 I was the chief economist of the Antitrust Division of the United States Department of Justice. During 1971-1972 I was the chief economist of the White House Office of Telecommunications Policy. I have testified in a number of an-

titrust and regulatory proceedings, including ones relating to local exchange, interexchange, and cellular telephony as well as paging. A copy of my curriculum vitæ is attached to this declaration.

II. Introduction and Summary

2. I have been asked by counsel for McCaw Cellular Communications, Inc., to provide an economic analysis of the "Petition of the People of the State of California and the Public Utilities Commission of the State of California to Retain State Regulatory Authority Over Intrastate Cellular Service Rates" (August 8, 1994 (CPUC Petition)). This section summarizes my conclusions. Section III examines the arguments made by the California Public Utilities Commission (CPUC) in support of regulation of commercial mobile radio service (CMRS) providers. Sections IV and V evaluate the effectiveness and costs of regulation, and Section VI evaluates the case for interim regulation. VII is a conclusion.

3. The Federal Communications Commission (Commission) should not grant the CPUC's petition. The Commission has recently concluded that relevant markets are sufficiently competitive to justify forbearance from regulation of cellular and other CMRS providers (*CMRS Second Report*, 9 FCC Rcd 1411 (1994) at ¶¶135, 145). Nothing in the CPUC petition undermines this conclusion. This is true regardless of which CMRS prices one is considering, for example, wholesale and/or retail prices for access, air time, roaming, or enhanced services.

4. The key question with respect to rate regulation, including interim rate regulation, is whether it is likely to be cost-effective in the future world to which it will be applied. It is generally acknowledged that the CMRS market is becoming more competitive as a result of changes in technology and various Commission initiatives that will permit or promote entry. Because the case for regulation cannot be justified based on evidence regarding past and present conditions, clearly there is no basis for continuing or future regulation.

5. *First,* the Commission has already found that "CMRS providers do not have control over bottleneck facilities" (*CMRS Second Report* at ¶237). In the case of cellular carriers this conclusion is clearly correct. For example, new CMRS systems do not need to interconnect with cellular networks (as opposed to the facilities of local exchange carriers (LECs)) in order to enter the mobile communications market successfully.

6. *Second,* no one, including the CPUC, has demonstrated that the presence today of only two cellular providers in each area has resulted in anticompetitive behavior, including supra-competitive pricing.[1] Without such a demonstration, no case can be made for regulation of CMRS prices. The CPUC has offered analyses and data that allegedly demonstrate that cellular carriers have been exercising market power. None of them, individually or collectively, demonstrates the exercise of market power. Claims about anticompetitive behavior are based on faulty economic analysis. By contrast, there is evidence of sufficient competitive behavior and benefits to consumers to justify continued forbearance from economic regulation.

7. *Third,* additional CMRS providers will soon offer competitive cellular-like services. As new CMRS providers establish themselves, any possibility that cellular carriers could acquire or exercise market power is eliminated.

8. *Fourth,* spectrum is inherently scarce, and the supply of spectrum available for CMRS services is further constrained by Commission spectrum allocation policies. To achieve an efficient allocation of the spectrum available for CMRS services, the prices of CMRS services must reflect the opportunity costs of scarce spectrum. This is true regardless of whether current license holders paid for their spectrum rights.

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1 See my declarations analyzing the petitions of other states in this proceeding, and my declaration submitted in CC Docket 94-54 (In the Matter of Equal Access and Interconnection Obligations Pertaining to CMRS, September 12, 1994).

9. *Fifth*, if state regulation of prices of cellular services were in the public interest, the CPUC should be able to demonstrate benefits from past state regulation. If there were benefits, one ought to be able to observe them by comparing states that regulated with states that did not. However, there is no evidence in the CPUC petition or elsewhere that regulation of cellular service prices in California or other states has had any beneficial effect in the past.

10. *Sixth,* regulation of CMRS prices imposes substantial costs. Price controls limit the ability of regulated firms to respond to changes in technology and in cost and demand conditions, and deter new investments, quality improvements, introduction of new services, and entry by reducing returns on pro-competitive activities. The distortionary effects of price regulations that limit returns on investments are likely to be greatest in industries such as CMRS that are characterized by rapid growth, technological change, and relatively high risk.

11. Based on my review of the evidence, it is my opinion that there is no empirical basis for believing that there is a problem with market performance that would warrant regulating CMRS pricing. Thus, the Commission's conclusion that the market is sufficiently competitive to justify forbearance from regulation of cellular and other CMRS carriers is correct. CPUC regulation of CMRS pricing would therefore be likely to harm consumers. There is nothing special about the nature of CMRS competition or regulation in California that would change this conclusion.

III. Market Structure and Performance

A. *Importance of Market Structure and Performance*

12. In order to assess any potential regulation, it is useful to begin by considering the implications of leaving decisions to market forces. This is commonly done in an antitrust context by defining a relevant market and then evaluating market concentration, conditions of entry, and other structural and behavioral evidence relating to the likelihood that suppliers are exercising, or may come to exercise, unilateral or collusive market

power. If market power is being exercised or is likely to be exercised in the future, then regulatory interventions may have benefits in preventing or stemming exclusionary or other anticompetitive behavior. Even if such benefits may result, however, they must be weighed against the fact that the regulatory intervention will impose its own costs, distortions, and disincentives. It would be wrong to assume that an imperfect market can be replaced with perfect regulation.

B. *Appropriate Standard for Intervention*

13. Two types of antitrust problems are potentially relevant to decisions on rate regulation: unilateral exercise of market power by a firm with monopoly power, and collusion to exercise market power. A special case of the unilateral exercise of market power, involving a firm with a monopoly over facilities that are essential for other firms to compete with it in a downstream market, is sometimes analyzed using the framework provided by the "essential facilities theory." The analysis of market structure and performance below is intended to assess whether there is, or is likely to be, a monopoly or collusion in the relevant markets.

14. Theories involving the exercise of unilateral market power, including the essential facilities theory, are not relevant to rate regulation of CMRS markets in which cellular carriers compete. The Commission has recognized that "CMRS providers do not have control over bottleneck facilities" (*CMRS Second Report* at ¶237). More generally, given the two cellular carriers, no firm has significant unilateral market power. Because one cellular provider could undercut efforts by the other to exercise market power unilaterally, the exercise of market power would require coordinated behavior or collusion by at least the two cellular providers, and in the near future personal communications services (PCS) and enhanced specialized mobile radio (ESMR) providers would have to participate in the collusion as well.

15. In contrast to merger analysis, where possible harms to competition are prospective, a condition for imposing price controls as a remedy

for an antitrust problem is strong evidence that significant market power has actually been exercised on a sustained basis. Otherwise, the case for intervention is insufficient to overcome the presumption that competition is sufficient that price controls are not warranted in light of their substantial costs.

16. The CPUC and several states that regulate cellular rates, as well as resellers and consultants working on their behalf, have proffered a variety of empirical analyses that purportedly demonstrate that cellular carriers are currently exercising market power by charging supra-competitive prices and restricting output. In Section III, I will evaluate a number of those analyses, with examples of sources where they have been presented.

17. The CPUC bases its analysis on standards contained in the Department of Justice and Federal Trade Commission 1992 Horizontal Merger Guidelines (4 Trade Reg. Rep. (CCH) ¶13,104). However, it is important to point out that the Merger Guidelines are designed for an entirely different purpose than evaluation of proposals to regulate the behavior of companies, including pricing. Section 7 of the Clayton Act (38 Stat. 730 (1914), 15 U.S.C.A. §18 (1993)), and the Guidelines that express the intentions of the federal enforcement authorities, are aimed at stopping mergers that may have the effect of reducing competition. The concern is with an incipient effect on competition. The Guidelines and their associated analytical mechanism are not necessarily applicable in determining whether prices at present are above competitive levels, whether companies are engaged in other anticompetitive activities, or whether regulations to deal with such problems would be appropriate. Indeed, the Guidelines explicitly consider whether a proposed merger is likely to make a given market less competitive, not whether that market is competitive to begin with.

18. Further, because the Guidelines are concerned with mergers, the potential benefits of which can often be achieved through internal growth of individual competitors, they employ a much stricter standard than may be relevant to other areas of antitrust analysis or public policy,

such as the remedies for monopoly or decisions to regulate. Indeed, the Department of Justice itself has explicitly recognized that the market concentration thresholds in the Guidelines are not applicable to behavioral regulation. In contrast to the Herfindahl-Hirschman Index (HHI) threshold of 1800 (which corresponds to between 5 and 6 equal-sized competitors) used in merger evaluation, in its analysis of oil pipeline markets the Department of Justice concluded that in making an initial determination about whether to deregulate certain pipelines it was appropriate to use a threshold of four firms (which corresponds to an HHI threshold of 2500 or higher):

> This HHI standard for initial high-risk status for pipeline markets is higher than the 1800 level used to demarcate highly concentrated markets in the Department's Merger Guidelines because of the different purpose served by the index. A higher threshold is used for suggesting that pipeline regulation may be appropriate than for determining that a merger is liable to lead to the exercise of market power because regulation itself imposes significant costs, whereas the economies foregone, if any, when a particular merger is prevented are apt to be less significant. (*Competition in the Oil Pipeline Industry: A Preliminary Report*, May 1984, at 28.)

19. Finally, the Guidelines themselves, by their terms, are necessarily concerned with probabilities, not certainties—because no one can predict with certainty the effects of a proposed merger.

20. The remainder of Section III is devoted to an analysis of the CPUC's discussion of the structure and performance of the CMRS markets in which cellular services compete.

C. *Market Definition*

1. Purpose of Market Definition

21. To be useful in analyzing competitive conditions, market shares and concentration must be computed for properly defined antitrust mar-

kets. A group of products or services and an associated geographic area constitutes an antitrust market if it is the smallest set of products and the smallest area capable in principle of being profitably monopolized. In other words, if one assumed that a hypothetical single firm controlled the supply of all the products in question, and if that firm could increase its profits by raising prices significantly above competitive levels, then an antitrust market has been defined. However, if a price increase by a hypothetical single firm would be unprofitable because consumers would switch in significant numbers to other products, then the market has been defined too narrowly for antitrust analysis.

2. Relevant Product Markets

22. Cellular services may be competitive with certain landline services, such as intra-LATA toll service, pay telephone service, and telemetry service (*Financial Services Report*, May 25, 1994; *Electric Utility Week*, Aug. 29, 1994, at 7). Cellular services would be competitive with additional landline services but for the fact that residential local exchange services are priced below costs. For customers with relatively long local loops, landline service costs are likely to be similar to or greater than cellular service costs. To analyze some policy issues, it is therefore appropriate to define relevant antitrust markets that include both cellular and landline services. Nevertheless, for the purposes of the present declaration I make the conservative assumption that landline services are not in the relevant product market in which cellular and cellular-type services compete.

23. Among the relevant product markets in which cellular services may compete, the one that is now, and is likely to remain, most concentrated is *mobile telecommunications services*, which I define as the collection of services of the type that cellular and broadband PCS offer or will offer within the next three to five years. As I will explain further below, at a minimum the participants in this market include cellular providers and broadband PCS providers with at least 20-30 MHz of spectrum. Participants are also likely to include broadband PCS licensees with 10 MHz of spectrum and ESMR providers with 5-10 MHz of spectrum. There may

eventually be other participants as well, such as satellite-based services. Also, in some cases consumers are likely to be in a position to substitute landline telephone, paging, and two-way mobile radio services for cellular-type services.

24. The definition of the mobile telecommunications services market used in this declaration is based on the fact that cellular, PCS, and ESMR licensees are all authorized by the Commission to provide the full array of mobile services (Stanley M. Besen and William B. Burnett, "An Antitrust Analysis of the Market for Mobile Telecommunications Services," Charles River Associates, Dec. 1993, at 1 n.1, and at 17-18). It is also based on the conclusion that "all portions of the electromagnetic spectrum that have been allocated to the provision of mobile telecommunications services can be used to provide all of the same services and at about the same cost" (Besen and Burnett at 18).

25. My definition of a relevant antitrust product market for mobile telecommunications services is consistent with the analysis of Besen and Burnett, who define a single relevant antitrust market for all mobile services, including cellular, PCS, and ESMR. In their discussion of the market, Besen and Burnett include services such as paging that require only limited amounts of spectrum. However, in computing concentration in the market, they include only cellular providers, broadband PCS providers (which will have at least 10 MHz of spectrum as a result of Commission licensing), and—in some of their calculations—ESMR providers with 5-10 MHz of spectrum.

26. Cellular systems may also compete in narrower relevant product markets, such as *wireless data transmission services* and *paging services*. However, any such narrower product market that may exist would have more participants and be less concentrated than the market defined for mobile telecommunications services. Because of the additional competitors and scope for entry in a narrower market, insofar as the regulations at issue in the present proceeding are concerned no additional competi-

tive issues are likely to arise in such markets that do not arise in a market for mobile telecommunications services.

3. Relevant Geographic Markets

27. Mobile telecommunications service suppliers compete in providing services in connection with both local and long-distance calls. The precise geographic areas appropriate for analysis of both local and long-distance calls is complicated by the fact that the relevant licensees (cellular A, cellular B, broadband PCS A and B, broadband PCS C-F, and ESMR) serve or will serve different, overlapping areas.

28. In order to define geographic markets in any specific situation, one must determine the extent of feasible geographic price discrimination. To the extent that price discrimination is not feasible, and uniform prices must be charged over a wide geographic area, geographic markets will be broader than if price discrimination is feasible. The broader are geographic markets, the greater will be the number of participants in the markets, and the lower will be concentration. For example, if the geographic market is broader than the Basic Trading Areas (BTAs) used for some of the broadband PCS licenses, the number of broadband PCS competitors in the market will exceed the number of licenses (including Major Trading Area (MTA) licenses) valid in any single BTA. The market share and concentration measures computed below, as well as those presented by Besen and Burnett and the CPUC, are likely to be biased upward because they are based on the implicit assumption that cellular licensees in different MSAs and PCS licensees in different BTAs are not in the same antitrust geographic markets (Besen and Burnett at n. 46 make the same point).

D. *Competitors for Cellular in Mobile Telecommunications*

1. Broadband Personal Communications Services

29. Digital personal communications services are being licensed in two portions of the radio spectrum. Broadband PCS will be in the 1850-1990

MHz range, while narrowband PCS will be in the 900 MHz range. There will be three 30 MHz broadband licenses and three 10 MHz broadband licenses.

30. There is general agreement that at least the 30 MHz broadband PCS licensees will compete with cellular providers. One observer has predicted that "broadband PCS systems will evolve primarily into cellular competitors. ... [E]conomic factors all suggest that the larger PCS systems, say 30 MHz MTA-wide systems, necessarily must target cellular subscribers ... to become their customers" (*Cellular Business*, March 1994, at 14, 16). According to Commissioner Andrew C. Barrett, "The three 30 MHz allocations, two at the MTA level and one at the BTA level, will provide significant opportunities for new entrants to compete against cellular providers and the emerging Enhanced Specialized Mobile Services market. This new framework achieves one of my policy goals of ensuring that at least three new PCS providers have a real opportunity to offer competitive alternatives to existing cellular players" (*TR*, June 13, 1994, at 5). A Commission staff report suggests that competitive PCS services can generally be offered with 20 MHz of spectrum (David P. Reed, *Putting It All Together: The Cost Structure of Personal Communications Services*, Federal Communications Commission, Office of Plans and Policy, 1992, at vii-ix). In addition, the Commission has stated that "narrowband PCS services may compete with cellular to some extent" (*CMRS Second Report* at ¶148).

31. Industry predictions suggest that PCS systems may have advantages over cellular systems, for example, additional service options, superior voice quality, smaller, lighter, cheaper handsets, and perhaps lower costs (*TR Wireless News*, June 30, 1994). Time Warner Telecommunications has been testing a technology that would make use of existing cable television plant to reduce the cost of deploying PCS services (*Multichannel News*, June 6, 1994, at 2). According to one industry analysis, "Putting all of these factors together, it does seem that PCS has at least a fighting chance to significantly underprice cellular services" (*TR Wireless News*, July 14, 1994).

32. One indication that those in a position to have the best information believe that PCS systems will be significant competitors is the substantial interest in, and the prices that companies are expected to bid for, PCS licenses.

33. Three pioneer preference 30 MHz MTA licenses have been awarded by the Commission. Remaining broadband PCS licenses presumably will be awarded next year. Thirty MHz broadband PCS licensees are required by the Commission to offer service to at least one-third of the population of their market areas within 5 years and two-thirds within 10 years. Ten MHz licensees will be required to cover 25 percent within 5 years or, alternatively, to submit a showing of "equivalent or substantial service" (*TR*, June 13, 1994, at 5).

2. Enhanced Specialized Mobile Radio Services

34. Specialized Mobile Radio (SMR) and ESMR service, like cellular service, uses spectrum in the 800-900 MHz range. The Commission has allocated 19 MHz to SMR/ESMR (*CMRS Second Report* at n. 296). In part because of restrictions imposed by the Commission, SMR has been used primarily for fleet radio-dispatch service. While most SMR systems currently use analog technology, according to a recent study 23 percent of the SMR industry is planning to implement digital technology in the next year. Digital technology will substantially increase capacity and permit firms to offer ESMR service, including integrated voice, messaging, paging, dispatch, and data services (*Land Mobile Radio News*, April 1, 1994; *Communications Week*, June 6, 1994, at 33).

35. Hausman concludes that "ESMR will provide a close substitute to cellular service" (Jerry A. Hausman, "Affidavit," *United States v. Western Electric Co., et al.*, D.D.C., 1992, at 16). Although ESMR may have certain handicaps compared to cellular (*CMRS Second Report* at ¶143), ESMR may offer a wider array of services. According to an industry analyst, many "customers were using SMR and cellular as two separate services, and now Nextel is offering them a package deal. Nextel also offers some advanced

messaging capabilities that only a handful of cellular providers have begun to offer" (*Communications Week*, May 30, 1994, p. 31).

36. Nextel, Dial Page, and OneComm have been acquiring SMR systems nationwide and entering into agreements to provide regional, and eventually national, ESMR service (*Communications*, April 1994, at 76, 78). Nextel has agreed to merge with Dial Page and OneComm and to acquire all Motorola's SMR operations. Assuming these transactions close, Nextel's licenses will cover approximately 85 percent of the nation's population in bandwidth slices ranging from 10 to 15 MHz per market (*Multichannel News*, Sept. 5, 1994), and it will have more than 650,000 of the reported 1.5 million SMR subscribers nationwide (*TR*, Aug. 8, 1994, at 39-40; *Mobile Satellite News*, Mar. 2, 1994). Because of the large number of systems under common ownership and the common use of the Motorola Integrated Radio System (MIRS) digital technology, Nextel will have advantages in offering seamless national service (*Land Mobile Radio News*, April 1, 1994). Nextel also has equity shares in Canadian and Mexican SMR providers.

37. An important issue is how long it will take ESMR providers to make their services available as substitutes for cellular service. Motorola has introduced handsets for transmitting voice, data, and fax messages over ESMR. According to press reports, Nextel offers ESMR integrated voice, paging, and two-way radio services in Northern California and Greater Los Angeles and expects to offer these services in several other areas by the end of 1994, when it expects to begin testing switched data services as well. It expects to begin testing packet switched services in 1995. OneComm plans to offer ESMR service in Denver, Seattle, and Portland, Oregon, in 1994. Dial Page is aiming to offer service in the South and Midwest in 1995. It is also reported that the major "MIRS-based ESMR providers have banded together and said they will offer seamless nationwide service as they deploy their networks during the next 2-1/2 years" (*Communications Week*, June 6, 1994).

E. *Competitors for Cellular in Wireless Data Transmission*

38. Wireless data transmission service will be even less concentrated than cellular-type service because all the providers of cellular-type service will be in the market along with a number of other types of providers.

39. At the local level, cellular providers can offer data services using circuit-switched technology. For example, in Buffalo the non-wireline carrier offers circuit-switched cellular data service for purposes such as remote monitoring (*Communications Daily*, Aug. 3, 1994). Cellular providers are implementing a nationwide network using cellular digital packet data (CDPD) technology. A number of cellular companies have begun using CDPD, including McCaw in Las Vegas and Bell Atlantic Mobile in Baltimore-Washington and Pittsburgh (*Computer Reseller News*, May 23, 1994, at 152; *Financial Services Report*, May 25, 1994). Bell Atlantic has predicted that CDPD will be in the top 60 markets by the end of 1994 (*Advanced Wireless Communications*, May 11, 1994).

40. SMR providers currently can offer wireless data service at the local level. There are also two providers of national wireless data network services, both of which are non-cellular: Ardis, owned by Motorola, and RAM Mobile Data, owned by BellSouth and RAM Broadcasting, have packet switched radio networks in large cities nationwide. In addition, satellite-based services offered by companies such as Qualcomm are used heavily by the trucking industry for purposes such as dispatching, messaging, and tracking vehicle and package locations (*En Route Technology*, July 5, 1994).

41. Non-cellular competitors that are entering wireless data service include Metricom, which has a network operating in the Silicon Valley area and hopes that by the end of 1996 the top 30 U.S. metropolitan sites will be equipped and running; Nextel and other ESMR providers; and narrowband PCS providers, such as Mobile Telecommunication Technologies' National Wireless Network, which is slated for roll-out in mid-1995 (*TELECOMREG Digest*, Aug. 8, 1994; *Computer Reseller News*, April 4, 1994,

at 55; *Mobile Data Report*, Feb. 28, 1994). PageNet, which has three national paging frequencies, is also able to provide wireless data services (*Newsbytes News Network*, July 25, 1994).

F. *Concentration*

42. The CPUC has calculated market concentration in mobile telecommunications services using Herfindahl-Hirschman Indexes (HHIs) and has compared these HHIs against standards contained in the Department of Justice and Federal Trade Commission 1992 Horizontal Merger Guidelines. The HHI is calculated by summing the squares of the market shares of the firms in the market. The smaller the number of firms and the more unequal their sizes, the larger the HHI will be, and by definition the more concentrated the market is. For example, if there are five equal-sized firms, each with 20 percent of the market, the HHI equals 5 x $(20)^2$ or 2000. If the HHI is above 1800, under the Merger Guidelines the market is "highly concentrated."

43. It is widely recognized that the HHI thresholds specified in the Merger Guidelines are not based on empirical evidence concerning the relationship between concentration and the likelihood that market power will be exercised (Paul A. Pautler, "A Review of the Economic Basis for Broad-Based Horizontal-Merger Policy," *Antitrust Bulletin*, Fall 1983, 571-651; Noel D. Uri and Malcolm B. Coate, "The Department of Justice Merger Guidelines: The Search for Empirical Support," *International Review of Law and Economics*, 1987, 113-20; F. M. Scherer and David Ross, *Industrial Market Structure and Economic Performance*, Houghton Mifflin, 3d ed., 1990, chap. 11). Also, the concentration thresholds in the Merger Guidelines are intended to implement the incipiency standard of Section 7 of the Clayton Act. As I have explained in ¶18, the Department of Justice has stated that these thresholds are not relevant for evaluation of decisions on whether or not to regulate an industry.

44. Besen and Burnett indicate that capacity is an appropriate basis for measurement of market shares "Because the available evidence suggests

that firms may move with relative ease from the provision of one mobile telecommunications service to another" (Besen and Burnett at 35). They argue that the appropriate measures of market shares and concentration are based on *effective* capacity, which takes account of the differences in bandwidth requirements per unit of information transmitted for analog and digital services (Besen and Burnett at 36). As long as cellular systems offer analog services, their shares of effective capacity will be less than their shares of bandwidth, because PCS and ESMR services are all digital. Forecasts of market shares and concentration based on effective capacity are complicated by the need to make assumptions about (i) the amount of bandwidth cellular systems will need to allocate to analog services in coming years, (ii) the relative efficiency of analog and digital services in transmitting information, (iii) the amount of bandwidth cellular providers and other entities will obtain in future PCS license auctions, and (iv) the bandwidth available to ESMR.

45. Using some of the same assumptions made by Besen and Burnett, suppose that cellular systems devote 10 MHz to analog, and that digital technology permits a 6-fold increase in effective capacity compared to analog cellular. Suppose also that the three 30 MHz and the three 10 MHz broadband PCS licenses are awarded to six independent non-cellular firms, and that SMR/ESMR bandwidth is consolidated and digitized by one additional company with 10 MHz. In this case, based on the Besen-Burnett methodology, each cellular system would have a 10.2% share of effective capacity, each 30 MHz PCS provider would have a 18.4% share, and each 10 MHz PCS provider and the ESMR provider would have a 6.1% share. The HHI would be 1370.

46. On the other hand, if one assumes that each cellular provider would obtain a 10 MHz PCS license, the cellular shares would be 16.3% and the HHI would be 1620. If in addition cellular systems convert entirely to digital technology, their shares would be 19.4% and the HHI would be 1651.

47. Finally, if one assumes, for the sake of argument, that a minimum of 30 MHz of bandwidth will be necessary to provide some cellular-type services competitively, the cellular shares for those particular services (assuming a uniform fraction of the capacity of each provider could be devoted to them) would be 21.9% and the HHI would be 2012. Of course, this list does not exhaust the possibilities.

48. These calculations ignore the possibility that providers with narrowband licenses, including paging licenses and narrowband PCS licenses, users of the 20 MHz allocation for unlicensed spectrum, users of UHF spectrum (in the event of a relaxation of Commission regulations), or satellite-based services will enter as new providers of competitive cellular-type services during the next several years. Hausman predicts that less than one-third of the spectrum allocated to paging as of 1992 will be used for paging by the year 2000 (Hausman at 7-8), which suggests that it could be used for other services.[2]

49. The CPUC has computed market shares and concentration based on a forecast by the Personal Communications Industry Association (PCIA) for the number of subscribers for cellular, PCS, SMR/ESMR, and satellite services in 1998 and 2003 (CPUC Petition at 75-78). Because the PCIA has forecast that PCS and SMR/ESMR will have lower shares of subscribers than of effective bandwidth in 1998 and 2003, this alternative methodology leads to higher shares for cellular systems and higher HHIs than those reported above based on effective bandwidth. There are two

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2 It has been suggested that there may be four or five companies in most cities (*Wall Street Journal,* Feb. 11, 1994, at R22, citing a consultant at Arthur D. Little; Edward M. Greenberg and Catherine M. Lloyd, "Telecommunications Services: POP Out: The Changing Dynamics of the Cellular Telephone Industry," *U.S. Investment Research,* Morgan Stanley, Apr. 23, 1991, at 20). If there are four or five companies with equal shares of effective bandwidth, the cellular shares would be 25 percent or 20 percent and the HHI would be 2500 or 2000. However, if the number of competitors in an area is a result of economies of scale and the size of the markets, there may be spectrum available for a new entrant in the event of anticompetitive behavior.

reasons to base market shares and concentration on capacity rather than on the PCIA forecasts for the number of subscribers. First, it is appropriate to use capacity rather than sales in measuring market shares when capacity provides a better measure of the competitive significance of a firm. For example, a firm with relatively small sales but significant capacity is likely to be in a position to expand sales rapidly in the event that its competitors raised their prices. Its competitors will therefore be less likely to raise prices than they would be if the firm lacked this capacity. Hence, in this example, capacity is a better measure of the competitive significance of this firm. Second, the PCIA's forecasts for number of subscribers are speculative, and hence the CPUC's market share and HHI calculations are unreliable even if it were appropriate to measure market shares by sales.

50. One cannot draw conclusions regarding either the performance of CMRS markets or the need for government regulation of prices from market shares and concentration alone. In evaluating price regulations, one must also evaluate entry conditions, conditions affecting the likelihood of collusion, the actual performance of the market, and the costs and effectiveness of regulation.

51. Also, one cannot reach an inference regarding the actual exercise of market power without empirical evidence, as the CPUC has done. The CPUC relies on the theoretical "Cournot duopoly model," which was developed in 1838, to conclude that cellular prices are supra-competitive (CPUC Petition at 64). This argument is seriously flawed and misleading. Even if one assumes, for the sake of argument, that the relevant market is at present a duopoly, the theoretical Cournot model is not sufficient to demonstrate that rates are unjust or unreasonable. The prediction about the level of duopoly prices depends on a particular *assumption* about how cellular systems behave. The Cournot model assumes that each firm conjectures that if it varies its output level, the other firm will continue to produce its current level of output (Dennis W. Carlton and Jeffrey M. Perloff, *Modern Industrial Organization,* Scott, Foresman, 1990, at 259). No empirical evidence in support of this assumption is presented by the CPUC. As far as I know, no one has attempted an empirical study of the

cellular telephone industry in an attempt to test that key behavioral assumption, which on its face is highly implausible for the industry. Other assumptions fail to produce the same predictions. For example, the Bertrand duopoly model assumes that each firm conjectures that if it changes its price, its rival will continue to charge its current price. The Bertrand model predicts that the duopolists will charge the competitive price (Carlton and Perloff at 259-76, which states at 274 that "many economists find Bertrand's model more attractive than Cournot's, because it explains how prices are set"). In any event, it is inappropriate to rely on a theoretical model in circumstances where the party bearing the burden of proof must demonstrate that rates *are* unjust or unreasonable—not that they *might* be.

G. ***Entry***

52. Entry by new competitors will be facilitated by the rapid growth in demand for and sales of mobile services.

53. It has been suggested by the CPUC that "The cost of the FCC license will be a formidable initial obstacle" to new entry into cellular-like markets (CPUC Petition at 72). This makes no economic sense. In fact, the price of licenses is determined by competition among the companies that want to enter. There are so many parties interested in entering that there is not enough spectrum to go around. The market price of licenses has no role whatsoever in limiting the number of new entrants. Rather, the price simply rations the available spectrum, assuring that it goes to the companies that expect the highest returns from entry. A high price is a signal that entry is profitable, not a barrier to entry.

54. As further evidence on the difficulty of entry, the CPUC has alleged that "cellular carriers have launched initiatives explicitly aimed at placing consumers in long-term contract plans in part to prevent them from switching to alternate technologies. This strategy harms consumers and competition" (CPUC Petition at 45). In California, the contracts in question offer lower prices in return for commitments to purchase specified

amounts of service over periods of one to three years and to pay a fee in the event of early termination (CPUC Petition at 30-31, 36). There is a serious logical flaw with the assertion that such contracts harm consumers. Customers cannot be made worse off by being offered an additional pricing option beyond the basic plan. If customers choose alternative plans, one can infer that those plans provide pro-competitive price reductions that more than outweigh any conditions and termination fees that are imposed. Under the CPUC's theory, a financial institution's 5-year certificate of deposit with a "substantial penalty for early withdrawal" would raise concerns. The Federal Communications Commission has found that, on balance, offers of equipment discounts to customers willing to commit to service with a particular licensee for a minimum length of time are pro-competitive and in the public interest (*CMRS Second Report* at n. 305).

H. *Conditions Inhibiting Coordinated Behavior*

55. In predicting the likelihood that a market will perform competitively, economists go beyond evaluations of concentration and entry. They also consider whether there are characteristics of the market that would make it difficult for suppliers to coordinate their behavior. Economists evaluate conditions that affect the likelihood that suppliers will be able to reach a collusive agreement on prices and to detect and punish cheaters that undercut the collusive prices. It is unusual for all such conditions to point in one direction or the other. Many markets have some characteristics that may tend, other things equal, to facilitate collusion and other characteristics that may tend, other things equal, to inhibit collusion. Typically, the issue is the balance of the characteristics. My analysis reveals several important characteristics of markets for CMRS services that economists would typically classify as inhibiting collusion. The CPUC suggests only one characteristic that it alleges facilitates collusion, namely, ownership of competing cellular systems by companies that are joint owners of cellular systems in other geographic areas. Even if this is assumed to be true, and even if this one characteristic of the market were assumed to outweigh the other, contrary factors, the result is mere

speculation about future possibilities, not evidence that rates are today unreasonable.

56. A number of characteristics of markets for CMRS services would make it difficult to collude to raise prices. The market is undergoing rapid change. Technological change is accompanied by the introduction of complex new services, expansion of capacity and geographic coverage, reductions in costs, changes in the ways services are marketed, and changes in pricing plans, all of which may differ among CMRS suppliers. In addition, demand and output are expanding rapidly. In this environment, competitors are unlikely to be able to reach or maintain an agreement on prices, to change the agreement as market conditions change, to arrive at agreements on prices of new services, or to be able to distinguish between price reductions that reflect changes in costs and price reductions that involve undercutting the agreement. The last of these points implies that there would be substantial scope for individual providers to increase profits by cheating. This is not a market in which one would expect to find stable cooperative arrangements among the competitors, even in a duopoly.

57. Even if change were not rapid, it would be difficult to reach and police an agreement on prices in light of the wide range of services in the relevant markets, variations in services and service quality (for example, blocking probabilities) among providers, provision of services on a bundled basis, and numerous pricing plans.

58. Different providers have different cost structures. For example, even in the case of cellular service, regional Bell operating companies and non-wireline services are likely to have different costs to the extent there are economies or diseconomies of scope with landline services or differences in regulation. Such differences in costs imply that different providers would not maximize profits with the same collusive price. This would make it more difficult to reach an agreement.