only if it is unjustly and unreasonably discriminatory.[64] From an economic perspective, to determine whether discrimination is unreasonable, the DPUC must analyze the effects of the discrimination on economic efficiency and consumer welfare.[65] The DPUC has not demonstrated that cellular rates are discriminatory or that they negatively effect consumer welfare. The DPUC presents no evidence that rates for wholesale service are above competitive levels, unjustly or unreasonably high, or discriminatory.

3. Cellular Providers Lack The Ability To Collude To Set Prices

The Commission has recognized that CMRS providers do not have control over bottleneck facilities.[66] More generally, given the presence of 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 to set prices would require coordinated behavior or collusion by at least two cellular providers and, in the near future, by providers of PCS services and ESMR providers.

There are a number of characteristics of the market for CMRS that would make it difficult to collude to raise prices. These characteristics include rapid technological change, which accompanied by the introduction of new services and the expansion of capacity, and the rapid expansion of demand. Collusive arrangements are difficult to reach and maintain where, as in the case of CMRS, there is a wide range of services, variations in service among

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[64] 47 U.S.C. § 202(a). Regulatory restraints on price discrimination can increase the likelihood of anticompetitive behavior. For example, restrictions on price discrimination in the Interstate Commerce Act of 1887 facilitated collusive pricing by U.S. railroads. Owen Declaration at ¶ 55.

[65] Id. at ¶ 56.

[66] Second Report and Order, 9 FCC Rcd. at 1499.

providers, and numerous pricing plans.[67] It is unlikely that new market entrants, with their natural incentive to cut prices to gain market share, would willingly charge high prices that would deter subscribers.

4. The DPUC Erroneously Considered Cellular Carriers' Rates of Return

As evidence that cellular systems have been exercising market power, Connecticut considers their accounting rates of return.[68] The DPUC's analysis is flawed.

Even if income and capital were properly measured, simple comparisons of rates of return are likely to be misleading. First, nothing relevant can be inferred from a high ratio of income to capital unless an industry is in long-run equilibrium, and the cellular industry is not in long-run equilibrium.[69] Second, even in long-run equilibrium, the ratio of income to capital will depend considerably on risk, which varies among industries. Relatively high rates of return can be expected where risks are high. Third, even in long-run equilibrium, what one expects to be equalized, other things equal, are expected rates of return, not the particular rates of return actually earned in any particular year or set of years.[70]

Moreover, accounting rates of return are not relevant to assessing market power because they use incorrect measures of capital.[71] For purposes of an economic analysis, replacement costs and the value of radio spectrum and other intangibles are a more appropriate measure than

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[67] Owen Declaration at ¶ 11.

[68] DPUC Petition at 1.

[69] Owen Declaration at ¶ 49.

[70] Id.

[71] Id. at ¶¶ 49-50.

the book values underlying accounting rates of return. Also, as in many other industries, new entrants into cellular service operate at a loss initially. These start-up losses should be capitalized and included in a firm's rate base. Accounting rates of return also ignore the fact that spectrum is a scarce asset that belongs in the rate base.

D. The DPUC's Proposed Regulatory Scheme is Costly, Economically Inefficient, and Unnecessary

1. The DPUC Has Failed To Show That Any Residual Risks To Consumers Outweigh The Substantial Costs Associated With Regulation

While the DPUC claims that state rate regulation is "in the best interests of the cellular consumers of the State,"[72] it has presented no convincing evidence that its regulation of cellular carriers, or that of any state, has yielded significant benefits to consumers.[73] In fact, state regulation would have no benefits but would result in substantial costs, both for the industry and the public.[74]

Because regulators lack sufficient resources to determine what levels are efficient and to monitor change in regulated rates as cost and demand conditions change, regulated prices would inevitably be below the efficient level in many instances.[75] For example, at least some state regulators appear to believe that prices should be set with reference to the historical cost of tangible assets, neglecting other replacement costs, including the scarcity value of spectrum.

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[72] DPUC Petition at 5.

[73] Owen Declaration at ¶ 64.

[74] Id. at ¶ 71.

[75] Id. at ¶ 68.

As a result, rates would be set at inefficiently low levels, would cause scarce resources to be wasted, and would harm consumers.

Price regulation would also limit the ability of regulated firms to respond to changes in technology, cost and demand conditions, thereby deterring new investments, improvements in quality, the introduction of new services, and the entry of competitors by reducing returns on pro-competitive activities.[76] Such regulation, especially when 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.[77]

While the DPUC claims that the end-user consumer is disadvantaged because "the lack of true competition has maintained retail rates at artificially high rates,"[78] it completely ignores the Commission's specific findings that tariff filings would actually enable carriers to ascertain competitors' prices and any changes to rates, which could encourage carriers to maintain rates at an artificially high level.[79] Given that publicly filed tariffs facilitate monitoring, tariffs

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[76] Id. at ¶ 69; see also Second Report and Order, 9 FCC Rcd. at 1479.

[77] Owen Declaration at ¶ 69.

[78] DPUC Petition at 3.

[79] Second Report and Order, 9 FCC Rcd. at 1479-1480.

actually simplify tacit collusion compared to when rates are individually negotiated.[80] The DPUC's concerns about the ramifications of tariff forbearance are unwarranted.[81]

2. Federal Remedies are Adequate to Address the Competitive Concerns Raised by the DPUC

The Commission has already determined that tariff requirements are "not necessary to ensure that the charges, practices, classifications or regulations for or in connection with CMRS are just and reasonable and are not unjustly or unreasonably discriminatory."[82] Indeed, the just and reasonable rate requirements of Section 201 and the prohibition on unjustly and unreasonably discriminatory rates of Section 202 "will provide an important protection in the event there is a market failure."[83] Connecticut consumers, including resellers, would have sufficient recourse because "the Section 208 complaint process would permit challenges to a carrier's rates or practices and full compensation for any harm due to violations of the Act."[84] The DPUC has not presented any information that Connecticut consumers would not be adequately protected by these Federal remedies.

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[80] Id. at 1479.

[81] See id. at ¶ 1474.

[82] Id. at 1478.

[83] Id. at ¶ 1478-1479.

[84] Id. at 1479. Further, the Commission's plan to initiate further proceedings "to establish extensive and ongoing monitoring of the cellular market place," negates the need for the DPUC to initiate a separate duplicative proceeding to monitor the relationship between wholesale carriers and resellers. See id. at 1467-1468.

Conclusion

The Commission should deny the DPUC's request for rate regulation authority. The DPUC has failed to satisfy the statutory prerequisites to the grant of such authority, and its analysis of the cellular marketplace is fundamentally flawed. The DPUC has not established that its proposed regulatory program will yield any benefits for the people of Connecticut.

Respectfully submitted,

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September 19, 1994

D31526.1

EXHIBIT A

BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C.

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 Connecticut 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 Connecticut Department of Public Utility Control," *In the Matter of Petition of the Connecticut Department of Public Utility Control to Retain Regulatory Control of the Rates of Wholesale Cellular Service Providers in the State of Connecticut,* FCC PR File No. 94-SP4, Aug. 8, 1994 (Connecticut Petition)). This section summarizes my conclusions. Section III examines the arguments made by Connecticut 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 Connecticut'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 Connecticut 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 Connecticut, 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. Parties that favor regulation of cellular carriers have 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. Entry by new competitors will be facilitated by the rapid growth in demand for and sales of mobile services.

8. *Fourth,* if state regulation of prices of cellular services were in the public interest, Connecticut 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 Connecticut petition or elsewhere

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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).

that regulation of cellular service prices in Connecticut or other states has had any beneficial effect in the past.

9. *Fifth,* 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.

10. 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. State regulation of CMRS pricing would therefore be likely to harm consumers. There is nothing special about the nature of CMRS competition or regulation in Connecticut that would change this conclusion.

III. Market Structure and Performance

A. *Importance of Market Structure and Performance*

11. 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 dis-

incentives. It would be wrong to assume that an imperfect market can be replaced with perfect regulation.

B. *Market Definition*

1. Purpose of Market Definition

12. To be useful in analyzing competitive conditions, market shares and concentration must be computed for properly defined antitrust markets. 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

13. 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.

14. 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 personal communications services (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 enhanced specialized mobile radio services (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.

15. 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).

16. 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.

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

3. Relevant Geographic Markets

18. 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.

19. 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 Connecticut, 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).

C. *Competitors for Cellular in Mobile Telecommunications*

1. Broadband Personal Communications Services

20. 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.

21. 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).

22. 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).

23. 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.

24. 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

25. 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).

26. 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).

27. 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.

28. 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 a number of areas 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 several areas 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).

D. *Competitors for Cellular in Wireless Data Transmission*

29. 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.

30. 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).

31. 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).

32. 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 na-

tional paging frequencies, is also able to provide wireless data services (*Newsbytes News Network*, July 25, 1994).

E. ***Concentration***

33. Connecticut cites the existence of high market shares and concentration as evidence in support of regulation using Herfindahl-Hirschman Indexes (HHIs). A number of parties have 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 $5 \times (20)^2$ or 2000. If the HHI is above 1800, under the Merger Guidelines the market is "highly concentrated."

34. 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. 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.)

35. 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.

36. 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.

37. 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.

38. 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.

39. 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]

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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

40. 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, empirical evidence on the actual performance of the market, and the costs and effectiveness of regulation.

F. *Performance*

41. Connecticut does not claim to be able to show that rates charged subscribers are unjust or unreasonable. Instead it says that it cannot find that rate structures are appropriate, and it contends that it wants further to examine cellular carriers' financial performance and the relationship between their rates and costs (Connecticut Petition at 14-15). Thus, Connecticut admits that it cannot make the case for continued regulation. In this section, I examine Connecticut's evidence regarding the exercise of market power. Claims about anticompetitive behavior are based on faulty economic analysis. By contrast, there is evidence of competitive behavior, and cellular customers have been benefiting from increasing service at declining real prices.

1. Pricing

42. The real prices of cellular service, adjusted for inflation, declined during each portion of the past decade for which I am aware of systematic studies. Besen *et al.* (at 2) report that on average in the ten largest cellular service areas real prices for access and 250 minutes per month of prime time use declined by 38 percent during 1983-1991. Another study reports that on average real prices for 150 minutes of air time per month declined by 27 percent or more during 1985-91 in the top 30 cellular markets (U.S. General Accounting Office, *Telecommunications: Concerns About Competition in the Cellular Telephone Service Industry*, 1992 (GAO), at 22-24). Hausman (at 13) reports that real prices declined about 10-12 per-

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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.

cent per year during 1987-92. At the same time, customers have benefited from expanding service areas.

43. In a study using data for 1989 and 1991, Hausman found that prices of cellular service were not lower in states that regulated those prices than in states that did not regulate them. He found that prices were 5 to 16 percent higher in states that required advance notice tariff filings for price changes (Hausman at 10).

44. Evidence on the price elasticity of industry demand for cellular service shows that cellular prices have not been at monopoly levels. An industry demand curve for cellular service measures the total demand for services from all cellular providers in a market, as opposed to the demand for the services from just one provider. The price elasticity of demand at a point along a demand curve measures how responsive the quantity demanded is to a change in price. If the price elasticity of demand is equal to one, then a one percent increase in price leads to a one percent reduction in quantity demanded. This implies that total revenue (price times quantity) is not changed by a small price increase. If the price elasticity is less than one, a one percent increase in price leads to a reduction in quantity demanded of less than one percent. This implies that total revenue will increase if price is increased. It is common for an industry demand curve to be characterized by a price elasticity of demand of less than one at low price levels and for the elasticity of the curve to increase as the price level is increased.

45. A price elasticity of less than one is consistent with competitive pricing and inconsistent with monopoly pricing. Hausman concluded that cellular systems typically operated at a point along the industry demand curve for cellular services at which the price elasticity of demand was substantially less than one (Hausman at 14). Hausman's finding implies that cellular systems were charging prices substantially below the monopoly level. This can be demonstrated as follows: If they had charged higher prices, given an elasticity of demand of less than one they would have increased their revenues (see ¶44). They would also have sold less output, and this would have enabled them to reduce their costs. Thus, a

higher price would have increased profits both by increasing revenues and reducing costs. From this Hausman infers that cellular suppliers were not colluding to raise prices to the monopoly level.

2. Output and Capacity

46. Cellular capacity, geographic coverage, and output have expanded rapidly throughout the past decade. The number of cellular subscribers increased from near zero in 1984 to 6.4 million in June 1991 and 19 million in the first half of 1994 (Hausman at 10; *Washington Post*, Sept. 6, 1994, at B4, citing the Cellular Telephone Industry Association). Besen *et al.* report that "Growth in cellular airtime also has been substantial, although it has been slower than the growth in number of subscribers because later subscribers have tended to use the service less intensively than earlier adopters" (Stanley M. Besen, Robert J. Larner, and Jane Murdoch, "The Cellular Service Industry: Performance and Competition," Charles River Associates, 1992, at 1).

3. Innovation

47. In addition to declining real prices, cellular systems appear to have been performing well in other dimensions. There has been substantial technological change, permitting better service (for example, reduced interference and fewer blocked and dropped calls), new services (for example, information services, voice mail, personalized traffic routing, and data services such as remote monitoring), and higher capacity and lower costs (for example, digital conversion). There have been many innovations in pricing and other aspects of plans used to market services (for example, pricing plans aimed at high and low use customers and occasional callers, discounts for usage outside the central business district, and equipment discounts and free air time for new customers).

4. Rates of Return

48. As evidence that cellular systems have been exercising market power, Connecticut considers their accounting rates of return. This line of analysis is fatally flawed

49. Even if income and capital were properly measured, simple comparisons of rates of return are likely to be misleading. First, nothing relevant can be inferred from a high ratio of income to capital unless an industry is in long-run equilibrium, and it is safe to say that the cellular industry is not in long-run equilibrium. Second, even in long-run equilibrium, the ratio of income to capital will depend considerably on risk, which varies among industries. Relatively high rates return can be expected where risks are high. Third, even in long-run equilibrium, what one expects to be equalized, other things equal, are *expected* rates of return, not the particular rates of return actually earned in any particularly year or set of years.

50. Furthermore, accounting rates of return are not appropriate for economic analysis because they use incorrect measures of capital. One should use replacement costs rather than book values, and one should include intangible assets. Also, as in many other industries, new entrants into cellular service operate at a loss initially. These start-up losses should be capitalized and included in a firm's rate base. Accounting rates of return also ignore the fact that spectrum is a scarce asset that belongs in the rate base.

5. Discrimination

51. The Connecticut petition seems to be based chiefly on the complaints of resellers that the vertically-integrated retail affiliates of the cellular licensees are getting a better deal from the licensees than are the resellers (Connecticut Petition at 3). Connecticut presents no evidence that rates for wholesale service are above competitive levels, unjustly or unreasonably high, or discriminatory.

52. In a system of dual distribution in which a wholesale seller offers service both through company-owned retail outlets and through independent retailers, independent resellers have an incentive to complain to regulatory officials in the hope of getting better treatment from their suppliers. The existence of complaints is not evidence of anticompetitive behavior, as much antitrust law and commentary makes clear (Phillip