WIRELESS *CARTERFONE*: AN ECONOMIC ANALYSIS

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I. Introduction

Skype/eBay has filed a petition[2] with the Federal Communications Commission requesting that the government impose rules on wireless telephone networks analogous to those levied on the pre-divestiture AT&T in *Carterfone* (1968).[3] The request is based on the claim that U.S. mobile phone carriers impose anti-competitive restrictions on the way their networks are used, limiting subscribers' choices of content, applications, and devices. The petition argues that consumers would be better off if a wide range of contractual arrangements – now routine – were prohibited. Skype proposes that the FCC impose rules mandating that subscribers be permitted to use whatever devices, content, or applications they desire, and to do so while receiving full access to the carrier's wireless network.

This paper offers theory and evidence to show that the proffered policy would undermine economic efficiency and is strongly anti-consumer. Specifically, it demonstrates how vertical integration (including vertical restraints) is both inevitable and productive, that regulators cannot usefully prescribe the extent to which wireless carriers integrate service into bundles, and that competitive rivalry between service providers efficiently guides and constrains carriers. Each firm weighs the benefits of integration against its costs. This classic trade-off, which defines the scope of firms, does not generally improve with mandates to narrow internal supply so as to expand the use of the "price system." Rather, efficient boundaries must continually be discovered via trial and error in the market.

The market that provides wireless choices for over 230 million U.S. subscribers is highly competitive – a conclusion repeatedly rendered by the Federal Communications

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[2] *Petition to Confirm a Consumer's Right to Use Internet Communications Software and Attach Devices to Wireless Networks* (Feb. 20, 2007).

[3] *Use of the Carterfone Device in Message Toll Telephone Service*, 13 FCC 2d 420 (1968).

Commission itself. In jockeying for new customers, and in striving to reduce churn – a profit-killing "Dear John letter" a dissatisfied customer writes to their carrier – networks must fully account for the costs their subscribers incur when their choices are truncated. Only if restricting such options leads to greater efficiencies in terms of cost reductions or quality enhancements will such proprietary solutions prove profitable.

This competitive process governs the rapid development of innovative content available to wireless users. Carriers are free to offer customers packages that include liberal or conservative "acceptable use policies," and to price customers' options for accessing non-carrier applications. With substitutes widely available, carriers profit by providing platforms that are attractive both with respect to price and quality – which encompasses the ability to utilize complementary services, devices, and networks. A blanket rule to impose "open access" would eliminate rivalrous outcomes that reveal the efficient suite of in-network services. That market process includes both pricing, where metering costs are reasonable, and governance limiting behavior, where metering costs are not.

Any claim that such restrictions are always or even usually anti-competitive is contrary to economic theory and to market evidence. Service providers with no conceivable anti-competitive motive, including non-profit organizations and firms lacking market power, routinely restrict customers' devices and use of the network in their "acceptable use policies" (AUPs). For example, Virginia Broadband (VBB), a wireless Internet Service Provider (WISP) serving fewer than 4,000 subscribers[4] both requires that subscribers use only the modems that are installed by VBB and that they refrain from "excessive" use of the network. VBB, in competing for subscribers, has evidently determined that the losses associated with the proscribed options are exceeded by the value of improved opportunities for network users overall. These limits help VBB create a competitive network; indeed, their rules are *productive inputs* into the supply of new broadband options.

An even starker example of usage restrictions is observed with respect to the (fixed) local area network owned by Ohio University. In a policy that went into effect in April 2007, students and faculty were prohibited from using any peer-to-peer application. The intent is clearly not to suppress competition. According to Chief Information Officer Brice Bible, "The network is a shared resource, and we must ensure that it is available to all users. Peer-to-peer file-sharing consumes a disproportionate amount of resources, both in bandwidth and human technical support."[5]

To cite still another example, NTT-DoCoMo thrives in the Japanese wireless phone market by offering a suite of favored applications and content, excluding others. Their

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[4] Virginia Broadband does not make BROADBAND EXCHANGE MAGAZINE'S "Top Ten" List of wireless ISPs for 2006. The subscriber count given for No. 10 (Camvera Wireless) is 3,851. *Broadband Wireless Exchange's 2006 "Top 10" Wireless Internet Service Providers (based on wireless subscriber counts),* BROADBAND EXCHANGE MAGAZINE; http://www.bbwexchange.com/wireless_isp/ .

[5] Notice, *Ohio University Announces Changes in File-sharing Policies*, Ohio University website (April 25, 2007); http://www.ohio.edu/students/filesharing.cfm.

innovative platform was a hit with customers and content providers, sparking rivalry by other networks.

These examples do not establish that *all* such arrangements are efficient. What is demonstrated, however, by these and myriad other instances of vertical restrictions and bundled packaging, is that a blanket rule barring such arrangements would deter efficiencies and cannot be justified by claiming that such arrangements are inevitably anti-competitive. In light of wireless market competition and the available antitrust-law backstop,[6] the call for regulatory intervention in this arena is unjustified and misguided.

This paper is organized as follows. Section II reviews how markets define the scope of firms, extending the classic analysis offered by Ronald Coase. Suppliers' choices about product attributes are constrained by the efficiencies realized via internal production versus opportunities to transact with outside firms. Section III then examines how the *Carterfone* regulatory analogy, lifted from a market in which a rate-of-return regulated monopolist was ordered to permit interconnection, applies to the current U.S. wireless market, where multiple, unregulated firms compete by offering rival service packages. Section IV details a notable example of such rivalry in the case of Japan's DoCoMo, network provider of the iMode wireless web platform. This innovative service has dramatically expanded Internet access for millions of subscribers and the content providers who wish to reach them, relying on a "walled garden" which carefully cultivates the content provided by third party providers. A summary and conclusion are then offered in Section V.

II. THE SCOPE OF FIRMS AND THEIR PRODUCTS

The essential contention of the Skype petition is that wireless services are efficiently provided under rules that permit customers to use networks without restriction. Limits imposed by carriers are ascribed to anti-competitive motives and remedied by "open access" regulations. The network operator may vertically integrate into the supply of various complements, but only on a non-bundled basis where independent suppliers have equal access to network customers as determined by regulators.

The purpose of this section is to demonstrate how ill-formed is the basic assertion that limits imposed by carriers are categorically anti-competitive. Once that is seen, it will be clear that the policy suggested is not welfare-enhancing.

I start with the standard analytical framework developed by Ronald Coase in his 1937 article, "The Nature of the Firm."[7] Every supplier of goods or services must make basic choices about the scope of its enterprise. How much of the final product it seeks to

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[6] See Alfred E. Kahn, *Presentation for FTC Workshop on Broadband Connectivity Competition Policy* (Feb. 13, 2007); J. Gregory Sidak, *A Consumer-Welfare Approach to Network Neutrality Regulation of the Internet,* 2 JOURNAL OF COMPETITION LAW & ECONOMICS 3 (2006).

[7] R.H. Coase, *The Nature of the Firm*, 4 ECONOMICA 16 (Nov. 1937); reprinted in R.H. Coase, The Firm, the Market and the Law 33 (Univ. of Chicago Press, 1988).

create, and what components it purchases from other suppliers, entail complex trade-offs that lie at the heart of economic organization. This choice-making process applies with equal force to contracts that define options for consumers to substitute other components in place of those selected or produced by the firm.[8]

The analysis produced by Coase was simple but powerful. In terms of the regulatory request put forth by Skype, its important implications are directly relevant. These can be summarized as follows:

- there is no obvious boundary to the scope of a given firm;
- all firms produce some components, allowing the market to supply others;
- firms compete by offering customers efficient product packages;
- profits flow to firms discovering efficiencies in packaging and firm structure

Coase modeled the firm's decision process as one in which a company sought the efficient result. It would produce internally whenever it could do so at a lower cost than outsourcing. In the first instance, production was organized by an "entrepreneur," and in the latter, by "the price system." Firms would expand until the cost of using the price system fell to a level lower than using the firm's own entrepreneurial skills.

A. Vertical Integration Everywhere

The Skype petition evinces the categorical view that more consumer choices are preferred to fewer, and that consumers should always be given opportunities to purchase components alone rather than in bundles. This clashes with the nuanced balancing test conducted in actual markets. Coase's analysis establishes that wireless carriers' strategies reflect scope-of-the-firm decisions that are ubiquitous throughout the economy. Every firm must decide, for literally each and every aspect of its business, whether to supply the associated inputs or to have other firms supply them.

When a wireless carrier constructs its business plan, it must determine what technologies to use, which hardware and software to deploy, how to build its network and how to deploy its services. In constructing its fixed facilities it supplies the capacity to host a range of anticipated (and, perhaps, unanticipated) applications, and thereby coordinates (implicitly and explicitly) its long-run offerings. Every element of decision-making entails choices about what the relevant inputs will be and where they will be garnered. And these choices critically shape – some might say *limit* – the choices consumers will be usefully offered in opting to use complements or substitutes.

Firms create in-house capabilities to supply some services and outsource others. In wireless, carriers generally depend on the price system when buying technologies, as standardized systems benefit from global economies, even as carriers also – in some

[8] See, e.g., Stephen N. S. Cheung, *The Contractual Nature of the Firms*, 26 JOURNAL OF LAW & ECONOMICS 1 (Apr., 1983).

cases – provide their own research & development to develop new technologies.[9] The Nextel network, using proprietary iDEN technology from Motorola, is an example of vertical integration (as Motorola took an equity stake in Nextel).[10] That other carriers have generally chosen to purchase their technologies from independent firms does not make them more or less "pro-consumer," and firms that produce their technology in-house do not "force" their subscribers to use it. Competitive options are available, and only by supplying service packages customers view as competitively superior can they be enticed to subscribe, such that a firm may "force" its in-house technology upon them.

Suppose that an "open access" rule mandated that carriers not impose a choice of technology, but permit customers to – at all times – select between CDMA or GSM technologies. The mandate is technically possible; there are dual-mode phones yielding access to these technologies (and more, including AMPS, iDEN, WiFi and TDMA). The choice of multiple technologies and extra networks would yield some level of consumer benefit, in that customers could obtain preferred solutions (clearer signal, better pricing) by selecting among technological options at each instance of use.

But customers would clearly, on balance, be hurt by such rules. In depriving them of choices, it would pre-empt their opportunity to capture efficiencies gained by adopting one technology to the exclusion of others. Imposing "openness" via multi-mode phones adds expense and limits the ability of consumers to evaluate the relevant trade-offs between costs and service options.[11] Indeed, carriers have made multi-mode phones and services available.[12] But the business they generate constitutes a small niche; the great majority of customers believing that their needs are better met using less expensive approaches. Carriers do not "force" a technology on their subscribers; rather, they cater to their interests by offering cost-effective handsets. Forcing "openness" would override these choices and reduce consumer welfare.

The Skype analysis assumes that consumers inevitably prefer more choices to fewer, and that when services are bundled by the supplier consumers are harmed. In fact, the basic role of business enterprises, as economic units, is to *reduce* customers' production efforts. Firms earn profits by *themselves* re-arranging inputs in productive ways. Firms compete to offer bundles, not the tiniest increments of individual inputs, and consumers willingly pay to choose among the rival packages created – by which they avoid vertical integration themselves.

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[9] Pac-Tel Cellular, an operator now owned by Verizon, was an early investor in Qualcomm's CDMA trials, helping to develop a new wireless technology it would later adopt. See David Mock, The Qualcomm Equation (New York: Amacom; 2005), pp. 76-81.

[10] Dan O'Shea, *How Nextel Beat the Heat Only to Face the Inferno,* TELEPHONY ONLINE (May 1, 2003); http://telephonyonline.com/wireless/business/wireless_nextel_beat_heat/.

[11] Multi-mode designs "can increase the number of components from 350 to 400 (for 2 or 2.5G) to almost 500. This leads to increased raw material, supply chain and manufacturing costs. It also makes building the phone more complicated, tends to make the device bigger and shortens battery life. A lot of the extra components are due to the need to install separate radio frequency transceivers and amplifiers for each mode." *Features Cut Phone Margins,* RED HERRING (Aug. 5, 2005). http://www.itbusinessedge.com/item/?ci=4322.

[12] Ben Charny, *New Phones Put World in Palm of the Hand,* CNET NEWS.COM (Sept. 14, 2004); http://news.com.com/New+phones+put+world+in+palm+of+the+hand/2100-1039_3-5364524.html.

Skype/eBay itself relies heavily on bundling. While on the eBay web site, users have access to all eBay auctions – and none of those occurring on the Yahoo! site or elsewhere. Those links could be presented to eBay visitors, but the firm's business model steers visitors to eBay content. Indeed, eBay's purchase of Skype in 2005 was undertaken to bundle additional services, and Skype calls are given preference on the eBay website over competitors. The incentive for eBay to improve visitors' experiences, and so return to the site to spend money, constrains the ability of eBay to "force" its customers to stick around. This is in every respect analogous to the wireless carriers' competitive position, including the length of contract terms – set with respect to efficient utilization of network resources.

B. Optimal Contract Terms

The basic economics also reveal that there is no logic to the rationale that choices made separately per each transaction yield more favorable outcomes for consumers than choices fixed by contracts covering longer periods. For instance, post-paid cellular contracts routinely span one to two years, and include handset subsidies (the carrier pays some or all of the cost of the phone) and early termination fees. Skype sees such contractual devices as "one more way in which the wireless industry restricts the ability of consumers to choose among available wireless services..."[13] Yet, to the extent that such terms create gains for cellular providers, networks predictably compete to attract such profitable customers. This rivalry competes away the gains in handset subsidies, favorable pricing terms ("free weekend minutes," "free on-net minutes," "free long-distance," etc.), trial periods, and network upgrades.

Customer acquisition expenditures, averaging about $350 per new customer for U.S. cellular carriers,[14] could be reduced by a network that expected that simply offering consumers more choices (fewer products in the standard service bundle) would be preferred by users and more efficient (considering the costs of uncoordinated choices for handsets, technologies, and applications) for the network. But the evidence is that such business models are neither preferred nor efficient. Instead, carriers compete vigorously, and expensively, to attract customers to ever more attractive service bundles.

Economic logic confirms that there is no reason to suppose that smaller increments of service – leaving more choices for consumers to make 'on their own' – are categorically superior to larger service bundles. Where a consumer does not want to absorb the cost of additional transactions, it will rationally opt for contract terms that span months or years and hundreds or thousands of transactions (phone calls); it will then re-evaluate the relationship and choose to re-subscribe if it appears superior to alternatives. This is exactly how cellular markets operate, where cellular carriers are typically evaluated by consumers at contract renewal time, and networks compete to retain customers.

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[13] Skype Petition, p. 13.

[14] Robert W. Crandall (2005), Competition and Chaos (Washington, DC: Brookings Institution Press; 2005), p. 106.

To do so, carriers not only extend favorable pricing terms (including handset subsidies), but contract with equipment suppliers to produce handsets embedding the network's technology, arrange roaming agreements so subscribers will be able to seamlessly access other carriers' networks (and airwaves) when traveling, actively organize a multitude of applications customized for the cellular network, and coordinate wireless traffic to reduce blocked/dropped calls. This latter effort involves enormous expenditures in fixed investment; since the beginning of the U.S. cellular industry, carriers have constructed about 195,000 base stations and sunk more than $220 billion in capital expenditure.[15]

These efforts aim to attract customers who will be "locked in" – for as long as they choose to be. Wall Street investors are keenly tuned to quarterly "churn" rates (the percentage of a carrier's subscriber base that drops its subscription in a given month). These data describe how customers – experts in how the particular network functions when and where they demand to use it – evaluate a cellular carrier's prices and services (including contractual terms). It is this information that propels investors to buy or sell the shares of companies owning wireless networks, and which therefore motivates the managers of these firms to reduce churn. This market competition effectively accommodates the desires of demanders and suppliers, and would be disrupted by ad hoc rules to force transactions into arbitrarily smaller increments.

C. Competition for Efficient Packages and Structures

Understanding the limitless nature of scope-of-firm choices brings us to another major implication: firms select their scope of activities to achieve efficiency. In the complexity of organizing economic activity, where firms bring together investors, workers, managers, suppliers, and consumers to coordinate myriad activities designed to produce value, every input is a variable. To see the outcome of a given pattern of market organization, and to see only that regulation can improve choices for some consumers on some margins, is to ignore the process that created the array of product bundles observed.

Firms arrange their operations to maximize profits. Each choice of input into the service bundles they offer customers is subjected to a cost-benefit test: will the gain in increased sales more than compensate for the expense in using this input? This is a simple economic calculation when broken down to its essential elements, but the number of input decisions even a small firm makes is large, and further complicated by the connectedness of the choices. When one type of product, production facility, technology, or communications network is selected, innumerable input choices down the road are implicated. Economies of scale can be created by narrowing input selections, which must be weighed against the gains from expanding product lines or diversifying suppliers; cheaper inputs may reduce demand, but will also reduce costs; internal production may

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[15] CTIA-The Wireless Association, Top-line *Semi-Annual Wireless Industry Survey* Results (Dec. 2006); http://files.ctia.org/pdf/CTIA_Survey_Year_End_2006_Graphics.pdf . See also CTIA-The Wireless Association, *Wireless Quick Facts* (Dec. 2006); http://www.ctia.org/media/industry_info/index.cfm/AID/10323 .

reduce the risk of market disruption or hold-ups, but require higher fixed costs, raising the cost of capital for the firm. Trade-offs abound.

Where the pro-consumer argument for regulation enters is where competition in the market fails to sufficiently constrain firms which may then have incentives to inefficiently bundle products in order to block entrants. Even with monopoly power this is a special case; lacking monopoly power the special case collapses. The idea that regulators can effectively substitute their judgment for the collective wisdom of a competitive market does not pass the plausibility test. By the FCC's own regulatory standards, it is not a credible policy conclusion.

III. *CARTERFONE* NOT

The analogy drawn to *Carterfone* lies at the heart of the Skype request for regulatory intervention:

> Skype respectfully requests that the Commission declare that *Carterfone* applies fully to wireless networks, to initiate a rulemaking proceeding to evaluate wireless carrier practices in light of *Carterfone* and to enforce *Carterfone*, and to create an industry-led mechanism to ensure the openness of wireless networks. Doing so will ensure both that consumers retain a right to run the applications of their choosing and a right to attach all non-harmful devices to the wireless network. These essential rights will prevent carriers from using illegitimate network management practices as an excuse for otherwise anti-consumer behavior.[16]

As I explain below, (1) the premises of the *Carterfone* policy – that new rules were required to deal with a rate-of-return regulated monopoly – are wholly absent in the wireless markets Skype seeks to apply this policy to today; (2) absent monopoly and rate of return regulation, market incentives best determine, from the standpoint of consumer welfare, what terms and conditions for network access a carrier offers.

As an initial matter, the thrust of the Skype petition is misdirected. That petition attempts to show how wireless telephony markets pervasively fail and how government mandates are widely needed to improve them. In using *Carterfone* as its model, the analysis is upside down. *Carterfone* was not an intervention into an unregulated market, but a change in policy with respect to a regulated monopolist. Since the 1934 Communications Act, AT&T's network had been extensively regulated by the FCC and state public service commissions. That this regime resulted in a network that was closed, inefficient, and anti-competitive was an outcome of that *regulated* market. That regulators initially sought to keep it closed to non-AT&T devices or applications is undeniable; the FCC determined in the 1950s, for instance, that Hush-a-Phone devices were "deleterious to the telephone system and injures the service rendered by it" and

[16] Skype Petition, p. 2.

could not be attached to the network.[17] This regulatory determination was overturned by the D.C. Circuit Court of Appeals in 1956. Over a decade later, the FCC, citing *Hush-a-Phone*, overturned regulated tariffs in its *Carterfone* decision. It is a non sequitur to advance *Carterfone* as a solution to "market failure." Its mandates did not reverse unregulated outcomes but were themselves a change in regulatory strategy, rejecting the policy the FCC had pursued to harshly suppress competitive, or even complementary, applications.[18]

A. The Importance of Regulation and Market Structure

Skype's petition rests on the premise that, prior to regulation, the old AT&T telephone network did not allow competitive devices or applications, and that government rules to promote access to such options jump-started telecommunications competition. For this analysis I will accept that explanation, abstracting from all complications and caveats. The rationale for imposing the requirements that forced AT&T to allow users of its telephone network to connect to "foreign" devices or networks was based on two primary considerations:

(a) the AT&T network was a monopoly,
(b) the network was rate-of-return regulated.

Each factor is crucial to understanding *Carterfone*, and its absence eliminates the logic underlying the policy.

Monopoly. Not only did AT&T enjoy market power, it was protected by franchise monopoly. No firm was authorized to offer service in rivalry with AT&T for local or long distance telecommunications. (The 1996 Telecommunications Act pre-empted state monopoly in local telecommunications service.[19] In long distance, MCI received limited authority to offer private line long distance services in 1969.[20] This authority was expanded in subsequent years, allowing for competition in long distance markets.) A monopolist may have incentives to inefficiently pre-empt independently-supplied vertical services which could develop into competitive platforms. Hence, the AT&T monopoly might have refused to interconnect with wireless phone services (in the *Carterfone* dispute in 1968), to stifle a new communications system that – while complementary at its inception – might turn into a substitute over time.

Regulation. Being subject to rate-of-return regulation, AT&T was limited in the prices it charged and profits it earned by supplying standard fixed line services. Price controls were set at levels determined by AT&T's costs. A means for AT&T to relax its

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[17] *Hush-a-Phone Corporation and Harry C. Tuttle, Petitioners, v. United States of America and Federal Communications Commission, Respondents, American Telephone and Telegraph Company et al., and United States Independent Telephone Association, Intervenors*, 238 F.2d 266 (DC Cir. 1956)

[18] *See* Peter W. Huber, Michael K. Kellogg & John Thorne, Federal Telecommunications Law (Aspen Law & Bus. 2d ed. 1999 & Supps. 2004 & 2005).

[19] Crandall (2005), p. 7

[20] IEEE Communications Society, *History of the Technology, 1952-2002* (Chapter 3); http://www.ieee.org/web/aboutus/history_center/conferences/comsoc/chapter3.html (visited Apr. 25, 2007).

profit constraint was potentially available via unregulated vertical services. If the firm invested in these services with funds that raised its fixed line costs, it would be able to increase its regulated prices. While accounting profits in the regulated market would remain constant, profits in the unregulated market would increase. This cross-subsidy strategy, enabled by regulators' difficulty in apportioning common costs of the network, made AT&T's vertical integration[21] problematic.

Competitive, unregulated markets eliminate the *Carterfone* rationale. An unregulated firm cannot subsidize inefficient vertical integration, for instance, by increasing costs. If it attempted to do so, it would simply reduce its profits, dollar for dollar. Not being rate-of-return regulated, it has no opportunity to stick customers with rate increases so as to maintain returns. Vertical integration must pay for itself.

Hence, vertical integration will generally be efficient, absent regulation. Even when undertaken by a monopolist, inefficient bundling decisions would be constrained by the complementarities between vertical products: firms profit by the availability of desirable complementary products, which raise demand for their goods and services. The notable exception is where the firm sees the complement as a potential competitive threat. That is why antitrust law is sometimes applied to vertical activities by firms with monopoly power.[22] Yet, lacking monopoly power,[23] attempts to thwart consumers' use of efficient vertical services will fail, as competitive providers profit from supplying what a firm unreasonably limiting consumers' choices will not. Indeed, these valued complements make the service in question more in demand, yielding competitors incentives to offer terms that include them, gaining market share from less accommodating suppliers.

In short, profit incentives align with consumers' interests, such that firms are driven to provide packages that feature the efficient level of access to vertical services – or firm scope, in the Coasean analysis. This straightforward logic largely explains why, when the FCC authorized personal communications service (PCS) licenses in 1992, the Commission determined that regulation was inappropriate. To wit:

> [W]e expect PCS to be a highly competitive service. We anticipate that PCS licensees will develop and offer a wide variety of services, some narrowly targeted to specific customer groups or niche markets, others more broadly targeted. These services will be subject to substantial competition, both from other PCS services offered under the rules we adopt in this proceeding and from the wide range of radio-based services currently offered: cellular services, specialized mobile radio services, paging services, wireless in-building services, cordless phones, and others. Service providers will have a strong incentive to offer attractive services

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[21] Vertical integration is achieved by ownership or contract. See Cheung (1983), op cit.

[22] As in the *U.S. v. Microsoft* case, where Microsoft's tactics in competing with Netscape's browser (a complement to Microsoft's operating system software, Windows) were thought by the government to constitute a strategy to protect the underlying operating system from competition.

[23] Horizontal competitors may, at least theoretically, collude to create and share monopoly power. This strategy must overcome prisoners' dilemmas, and is in any event illegal under the antitrust laws.

> and prices because any customer will have numerous service options from which to choose. Thus, regardless of whether PCS is determined to be a private or common carrier service, there will be no captive customers who must take the service from a monopoly (or near monopoly) service provider, and government rate and service regulation should not be necessary to protect customers from monopoly abuse. Accordingly, regardless of the regulatory classification, we tentatively conclude that PCS should be subject to minimal regulation.[24]

As anticipated, competition has successfully developed, as the FCC has consistently found on numerous occasions, in the context of its annual CMRS Reports, in analyzing industry concentration in the Spectrum Cap proceeding, and in evaluating mergers within the sector. For instance, in its most recent CMRS Report, the FCC determined that "competitive pressure continues to drive carriers to introduce innovative pricing plans and service offerings, and to match the pricing and service innovations introduced by rival carriers. Price rivalry is evidenced by the introduction of 'mobile to anyone' calling options, and by the proliferation of a variety of prepaid plans, or distinct prepaid brands (such as "Boost Mobile"), targeted at previously untapped segments of the market."[25] The rationale for deregulation has been fulfilled by the Commission's own findings.

B. Regulating the Scope of Firms

Legally imposing lines around the scope of the network replaces the function provided by market forces. The proposal therefore begs the question: what party is best equipped to make decisions to optimize network utilization? Given the history of wireless telecommunications, the answer is obvious: network owners have better information and superior incentives for protecting users' interests than business interests (including input suppliers or applications providers) which do not internalize all costs and benefits of network operations, or government regulators who must rely on information supplied by others and who have no personal stake in market outcomes.[26]

Skype's requested voice-over-Internet (VoIP) policy is illustrative. The firm seeks regulation to guarantee that its service will be available, at zero incremental cost, to all broadband subscribers. The suggestion is that, but for the anti-competitive profit motives of wireless carriers, such access would be available already. But that claim is contrary to available evidence, as many broadband networks entirely lacking profit motives have sought to block certain VoIP applications as *costly to the network.* For example, university LANs (local area networks) have often restricted peer-to-peer VoIP applications as offered by Skype because such applications add system cost, congestion,

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[24] *Notice of Proposed Rulemaking and Tentative Decision,* FCC Rcd. 5676 (1992), par. 94.

[25] FCC, *Annual Report and Analysis of Competitive Market Conditions With Respect to CommercialMobile Services, Eleventh Report* (Released on Sep. 29, 2006) par. 3.

[26] For a general analysis of the incentives of regulators, see the classic treatment by Charles Wolf, Jr., Markets or Governments: Choosing Between Imperfect Alternatives, Second Edition (MIT Press, 1993).

and security threats.[27] In the college network setting, profit motives are lacking and no competitive, or anti-competitive, benefits available to networks. Nonetheless Skype regards this behavior, when exhibited by carriers, as "using illegitimate network management practices as an excuse for otherwise anti-consumer behavior,"[28] and seeks regulation to prohibit it. This blanket restriction – regulation applied both to network owners and to consumers, who are deprived of a right to enter into contracts deemed inappropriate -- would thereby eliminate pro-consumer actions taken by IT managers to protect users. This pre-empts bargaining among parties in the market to negotiate mutually beneficial terms for network applications, sacrificing efficiencies from cooperation between networks and application providers.

C. Efficiencies of Competitive Network Owners

Given current demands, costs, and the requirements of untethered mobility, cellular networks crucially rely on management coordination. This is particularly true in the creation of advanced data networks – of which DoCoMo's iMode system in Japan is a stellar example (discussed below). Consumers rely on networks to invest substantial resources to create infrastructure, coordinate technology, price access, and otherwise police traffic flows such that they can reliably use wireless applications when and where they like. *Carterfone* plainly is not a useful approach for today's competitive, unregulated mobile networks, which demonstrably benefit from cellular operators' coordination of complex spectrum sharing.

Heavier regulation was tried in wireless, during the cellular duopoly, and then abandoned with the introduction of PCS competition. Its removal graphically demonstrated the superiority of competition to regulation in consumer protection. Under the cellular duopoly – where state Public Service Commissions were permitted to control cellular rates at the retail and/or wholesale level – prices for mobile phone service averaged over 50 cents per minute. When state regulation was pre-empted, and all price controls (including wholesale "open access" mandates) abolished in 1994, the result was

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[27] Many universities in England have blocked access to Skype from university-connected computers. The issue has been reported as follows:

> Lots of IT managers simply want to shut Skype down. "I wouldn't go so far as to say all companies should block Skype," says Brown, "but it's something they should be aware of."
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> Skype denies that it's unpopular with IT. "I speak frequently to enterprise IT departments and CIOs about trying to integrate Skype into their architectures," says Kurt Sauer, director of security operations at Skype.
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> But, even before the botnet threat emerged, the UK's university networks blocked Skype, says Crowcroft: "It's not to stop people getting free voice calls, but because the uncontrolled extra traffic gives us a large bill - and is against our acceptable use policy." When it lost the UK's university students, Skype lost two million paying customers, who would have bought credit for SkypeOut, says Crowcroft.
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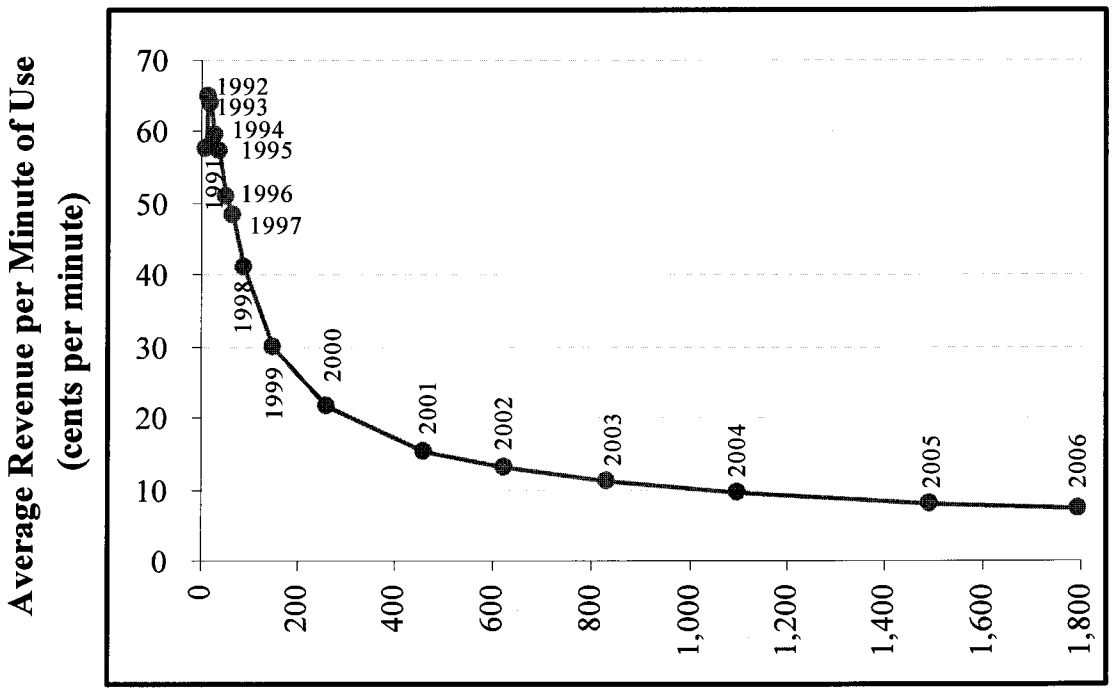
> Blocking Skype is not easy, though, because Skype wants its software to be used. "There's an arms race between firewall manufacturers and applications like Skype," says Brown. IT managers block Skype as much as they can, but it often finds a way through.

Peter Judge, *How Bad is the Skype Botnet Threat? Skype's Sneakiness Leads to a Security Risk*, TECHWORLD (Jan. 25, 2006); http://www.techworld.com/security/features/index.cfm?featureid=2199.

[28] Skype Petition, p. 2.

that prices did not increase, not even in the interim between deregulation and the entry of new PCS licensees.[29] And when the new networks began offering service, prices plummeted – to 11 cents a minute in 2003 and about 7 cents a minute in 2006. See Fig. 1. The "opening" of cellular networks under regulated terms and conditions failed to protect consumers; deregulated competition, however, did.

FIG. 1: REV/MOU VS. MOU, U.S. MOBILE PHONE SERVICE, 1991-2006



Source: Semi-Annual Wireless Industry Survey, CTIA except minutes of use in the second half of 2006, which is collected from *Wireless Quick Facts,* CTIA.
Notes: REV/MOU = revenue per minute of use. Total revenues, containing local service revenues and roaming revenues, is divided by total minutes of use that includes total billable minutes from local calls as well as roaming to calculate average revenue per minute of use.

In 1992, the FCC established the policy currently followed by the Commission, arguing that bundling restrictions (of the sort imposed via *Carterfone*) were inappropriate given the end of rate-of-return regulation and the emergence of competition:

> [T]he lack of regulation based on rate-of-return principles, combined with the absence of monopoly status for cellular carriers, significantly reduces one important motive for carriers to bundle – to build unregulated CPE costs into the service rate base and cross-subsidize at the expense of the subscriber. As the DOJ notes, 'absent a guaranteed return on their cellular service investments, carriers cannot expect to recover CPE discounts by including it

[29] Thomas W. Hazlett, *Is Federal Preemption Efficient in Cellular Phone Regulation?* 56 FEDERAL COMMUNICATIONS LAW JOURNAL 155 (Dec. 2003).

(the amount of the CPE discounts) in their rate base. We agree with this conclusion.[30]

The choice was made to reject the "regulated monopoly" approach and to embrace competition, delegating the old regulatory choices to the market. As Reed Hundt, FCC Chair during the PCS licensing phase, declared: "We totally deregulated wireless."[31]

The *Carterfone* policy had been relegated to history in wireless as of 1992; its application is even more antiquated today. Cellular rivalry, invigorated with the award of PCS licenses and further encouraged by the recent (2006) auction of AWS licenses, demonstrates how effectively market competition substitutes for regulation. One interesting result is that, under wholesale rate regulation, such as was imposed by the Public Utilities Commission in California, no substantial competitive networks resulted. Yet, unregulated markets today host at least two dozen MVNOs[32] – mobile virtual network operators that use the physical networks of licensed carriers to provide a range of diverse devices, pricing menus, and data applications, targeting consumers demanding specialized use of wireless networks. These third party providers contract with existing cellular networks to provide vertical services – or suites of services – economic activity that is judged by carriers as compatible with other network applications. These burgeoning markets offer graphic evidence of the intense interest shown by carriers in promoting wholesale network access for the benefit of millions of customers.

Such developments illustrate how competitive forces organize markets in innovative ways, discovering and satisfying consumer demands. Tracfone, for instance, offers pre-paid services with meters that display minutes remaining, helping its more than 7 million customers "track" usage.[33] These subscribers gain wireless access via the physical facilities of dozens of cellular networks, each of which contracts with Tracfone.[34] The Tracfone target market consists of infrequent cell phone users, including low-income workers and retirees[35]; the average revenue per user is just $13,[36] compared to a U.S. mean (2006) of over $47.[37] Virgin Mobile, alternatively, focuses on the youth market, serving more than 4 million subscribers via the Sprint cellular network, which entered a

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[30] FCC, *Report and Order,* 7 FCC Rcd No. 13 (Released on June 10, 1992), par. 25.

[31] Reed Hundt, You Say You Want a Revolution (New Haven: Yale U. Press; 1999), p. 98.

[32] OECD, *Fixed-Mobile Convergence: Market Developments and Policy Issues,* REPORT PRESENTED TO THE WORKING PARTY ON COMMUNICATION INFRASTRUCTURES AND SERVICES POLICY (March 23, 2007), p. 26.

[33] Tracfone, http://www.tracfone.com/howitworks.jsp?nextPage=howitworks.jsp&task=howitworks.

[34] *TracFone Scores 215,000 Customers During Third Quarter,* 25 RCR WIRELESS NEWS 44 (Oct. 30, 2006), p. 25.

[35] Vince Vittore, *Prepay: Upfront and Center,* TELEPHONY ONLINE (Nov. 1, 2003); http://telephonyonline.com /wireless/mag/wireless_prepay_upfront_center/.

[36] America Movil S.A.B. De C.V., *Fourth Quarter of 2006 Financial and Operating Report* filed with SEC (Feb. 9, 2007); http://www.secinfo.com/d17EG1.u81.htm#1stPage.

[37] Computed by dividing the total wireless revenues per month (the number reported for the second half of 2006 is divided by 6) by the total number of wireless subscribers at year-end 2006. Source: CTIA-The Wireless Association, *Wireless Quick Facts* (Dec. 2006); http://www.ctia.org/media/industry_info/index.cfm/AID/10323.

partnership with Virgin's parent company to form the venture.[38] Newer MVNO entrants such as Helio and Amp'd are specializing in high-end, data-intensive users.[39]

It is revealing that, in these spontaneous market outcomes, incumbent cellular operators host direct retail competitors – selling billions of wholesale minutes to firms which are then enabled to reduce the carrier's market share of end users. Since the Skype allegation is that restrictions on phone networks are instituted to restrict 3rd party suppliers from competing, that carriers host this widespread rivalry is left unexplained.

The service packages offered MVNO customers are targeted, "forcing" customers to choose between the phones and services pre-selected by the retailer. Tracfone currently offers 16 handset models, for instance, Virgin Mobile 10 (also 8 older or discontinued models). Helio is promoting its only two models (Heat and Drift) as advanced, multi-functional radios that offer wide-area broadband data access along with local-area network wi-fi links. Jitterbug, an easy to read, easy to use phone marketed largely to senior citizens, offers two models, which connect to a live operator but do not enable access to data services.[40] Kajeet, a service aimed at the "tween" market, is developing 6 phones for its Spring 2007 roll-out.[41]

Each MVNO *could* offer far broader selections, allowing their customers greater freedom to use different devices (including multi-mode phones) given the range of options featured by MVNOs across the market. But each of the firms chooses to truncate such choices to capture other efficiencies, including gains from specialization. Economies of scale in purchasing bulk quantities, and savings realized when marketing and technical support focus on fewer models, produce trade-offs suggesting to each of these MVNOs that limited device choices are *pro*-competitive.

Similarly, rural WISPs – as in the VBB example noted above -- restrict the amount of data their customers are permitted to download, the types of files sent, and the use of devices accessing their network. Rules to block these market outcomes will disrupt efficiencies. The same types of management efficiencies are also available to larger networks. A blanket rule condemning all network control devices would deter the creation and expansion of wireless networks for voice and broadband.

D. *Carterfone* v. UNE-P

How is it, then, that *Hush-a-Phone* and *Carterfone* rules appear to have succeeded in promoting competition, given that they imposed arbitrary regulatory interfaces on the

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[38] *Virgin Mobile USA Ends Year With 4.6 Million Wireless Subscribers,* CELLULAR-NEWS (Jan. 5, 2007); http://www.cellular-news.com/story/21244.php.

[39] Sue Marek, *Pre or Post – The Battle Continues,* WIRELESSWEEK (July 1, 2006); http://www.wirelessweek.com/article.aspx?id=90572 .

[40] David Pogue, *Some Phones Are Just, Well, Phones,* THE NEW YORK TIMES (Sep. 28, 2006); http://www.nytimes.com/2006/09/28/technology/28pogue.html?ex=1317096000&en=318ccccf0ee04bca&ei=5088&partner=rssnyt&emc=rss . It does, however, produce a dialtone, and connect to a human operator when a user punches "0."

[41] Kelly Hill, *Interview: Daniel Neal,* RCR WIRELESS (April 2, 2007), p. 8.

existing fixed-line telephone network? This question has been partly answered by the monopoly and regulatory distinctions discussed above, pre-existing conditions that made such government intervention a potentially pro-consumer policy. A further answer is supplied by former FCC Chief Economist Gerry Faulhaber. In his 2003 paper,[42] he examines episodes in which "open access" requirements set by government appear to have succeeded in advancing consumer interests, and those in which they have failed. The Skype petition, while presenting an argument based on the purported success of the *Carterfone* policy, fails to incorporate – or even acknowledge – the many failures of "open access" regulation.

Faulhaber helps provide the necessary balance. He finds "a transaction cost theory of the firm" useful in order to see where mandates to unbundled packages are able to work in a pro-consumer fashion. He concludes that "open access" will not likely be successful where "transactions... are best done *within* the firm,"[43] writing that, "transaction costs thus help define the optimal boundary of the firm: all complex transactions take place *inside* the boundary and only simple transactions take place *across* that boundary."[44]

His policy conclusion is that the wall-plug modularity that helped introduce competitive customer premises equipment (CPE) into the AT&T monopoly following *Carterfone* (and other decisions) offered a relatively simple transaction that – by the nature of the network interface – did not implicate complexity involving other users of the network.

> [A] simple technical specification could enable an existing industry to sell CPE to customers and seamlessly plug into the existing telephone industry, all at very low transactions cost. In other words, the CPE/network interface is a "natural" market boundary, in which transactions cost are very low. The FCC deregulation of CPE thus transformed a somewhat unnatural integration of CPE and the network into the more natural market disintegration at very low cost.[45]

But these conditions, Faulhaber augurs, were unique. "The success of CPE deregulation via an FCC administrative fiat was not to be repeated." Conditions elsewhere generally did not admit to easy regulation-defined boundaries. In particular, Faulhaber notes the failure of unbundling rules to induce competitive local exchange service. Writing just as these network sharing, or "open access" rules, were being overturned by federal courts and abandoned by the FCC, the experiment has now been performed in reverse: facilities-based competition has *accelerated* in the absence of LEC sharing rules.[46] If the plea for a "wireless *Carterfone*" is to be entertained, it is

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[42] Gerry R. Faulhaber, *Policy-Induced Competition: The Telecommunications Experiments*, 15 INFORMATION ECONOMICS AND POLICY 1 (March 2003).

[43] Faulhaber, op. cit., p. 77 (emphasis in original).

[44] Faulhaber, ibid.

[45] Faulhaber, op. cit., p. 79.

[46] Thomas W. Hazlett, *Rivalrous Telecommunications Networks With and Without Mandatory Sharing*, 58 FEDERAL COMMUNICATIONS LAW JOURNAL 3 (June 2006).

appropriate that the policy be simultaneously evaluated as a "wireless UNE-P" petition, taking cognizance of the multiple outcomes observed for the proffered regulatory regime.

IV. NETWORK RULES AS PRODUCTIVE INPUTS: THE CASE OF DOCOMO

Wireless markets discover consumer-pleasing innovation, relying heavily on coordination supplied by rival networks. These enterprises bring investors, technology suppliers, applications and content vendors together in a coherent manner, organizing activities to support the joint costs associated with network development. Without this coordinating function, consumers would be deprived of a rich mix of valuable services. This activity is highly productive but violates, at almost every step, *Carterfone* regulatory principles advanced by Skype.

There are myriad examples, but a convenient one to focus on is the wireless data system known as i-mode, developed by NTT's DoCoMo in Japan. This pioneering network brought web access to millions of customers beginning in 1999, *before* cellular systems were re-engineered for broadband (or 3G) applications. The network was a runaway success with Japanese consumers, attracting over 30 million subscribers in just three years (see Table 1), and has become a paradigm business model success story. "NTT DoCoMo," writes a British business publication, is "the most experienced company of all in building ecosystems."[47] .

And that is where the i-mode story begins: with the realization that wireless service depends critically on the creation of a family of products. The Skype argument is that government regulation to limit networks will best provide for these complementary inputs, but DoCoMo created an "ecosystem" advancing the wireless web by exerciseing control over a wide range of products complementing wireless connectivity, bundling them (and excluding others) for the benefit of its customers.

NTT DoCoMo[48] launched i-mode in February 1999 as "the first packet-based, always-on, mobile Internet service available anywhere in the world."[49] "Official" i-mode vendors are featured on the phone's menu, enabling customers to easily access their content. Billing is handled exclusively through DoCoMo, which lists transactions on subscribers' monthly statements, and charges content providers nine percent of revenues for the service. DoCoMo also allows "unofficial sites" to be accessed by i-mode users, and these vendors can charge customers however they wish. But such sites are at a disadvantage, particularly given the relatively limited use of credit cards in Japan.

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[47] *Microsoft Excluded from DoCoMo's Ecosystem*, THE REGISTER (Nov. 26, 2004); http://www.theregister.co.uk/2004/11/26/microsoft_excluded_from_docomo/.

[48] Originally NTT Mobile Communications Network. Renamed NTT DoCoMo in April 2000.

[49] John Ratliff, *DoCoMo as National Champion: I-Mode, W-CDMA and NTT's Role as Japan's Pilot Organization in Global Telecommunications* (Santa Clara, California: Santa Clara University, 2000), p. 12.

This directly implicates the regulatory issues raised by Skype. Indeed, critics complain that DoCoMo erected a "walled garden" limiting customer choice.[50]

The truth is just the reverse: i-mode has created an innovative hot-house for content, optimizing its delivery via network control. By enabling a platform that encompasses pricing and vertical restraints (including payments to the ISP and inclusion in the preferred providers list based on compliance with operator-set specifications), content providers have been given more productive opportunities to search for value-added niches. Writing in *Wired*, Frank Rose sees the "walled garden" view as simplistic.

> At the heart of all this is a paradox: i-mode depends on outside providers for everything from handsets to content, yet it's managed so carefully that nothing is left to chance. Critics see a walled garden, more mobile mall than wireless Web. But in fact, i-mode's success comes less from being walled than from being obsessively tended.[51]

The network both restricts and coordinates user access to applications and content, for the purpose and effect of producing value for consumers. "It's a complex ecosystem—a self-sustaining world in which hundreds of companies, from Bandai to Cybird to DoCoMo itself, feed off one another for their mutual benefit."[52]

Rather than provoke objections from content providers opposing DoCoMo's far-reaching control of the platform (or its nine-percent commission), the platform has proven exceptionally popular. Katzutomo Robert Hori, CEO of Cybird, with 23 sites connected to i-mode, says that, "For a company like us," Hori said, "the i-mode environment has proven very profitable."[53]

These gains from trade have been the result of active decision-making by the network to shape the platform on which content providers operate. In doing so, DoCoMo necessarily favors certain technologies, formats, or business models, disadvantaging others. One important instance occurred in DoCoMo's decision to support Linux and Symbian software for i-mode applications, but to exclude Microsoft. [54]

The argument Skype makes against such network control is that innovation will suffer. But Jack Qiu of the University of Southern California finds that i-mode customers are loyal to the service due, in large part, to a steady stream of content innovation.[55] In fact, the Internet access provided by DoCoMo proved so consumer-friendly that it became Japan's leading ISP.

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[50] Frank Rose, *Pocket Monster*, WIRED (Sept. 2001).
[51] *Ibid.*
[52] *Ibid.*
[53] *Ibid.*
[54] *Microsoft Excluded from DoCoMo's Ecosystem*, THE REGISTER (Nov. 26, 2004); http://www.theregister.co.uk/2004/11/26/microsoft_excluded_from_docomo/.
[55] Jack Qiu, *NTT DoCoMo: Review of a Case*, JAPAN MEDIA REVIEW (Oct. 2004); http://www.ojr.org/japan/research/1097446811.php.

TABLE 1. DOCOMO I-MODE SUBSCRIBERS AND REVENUES, 2002-2006[56]					
	3/2003	*3/2004*	*3/2005*	*3/2006*	*3/2007*
Cellular subs (millions)	44.1	46.3	48.8	51.1	52.6
I-mode subs (millions)	37.8	41.1	44.0	46.4	47.6
DoCoMo mobile market share (%)	58.1	56.6	56.1	55.7	54.4
i-mode subs/ DoCoMo subs (%)	86.1	88.7	90.2	90.6	90.4
Aggregate mo. ARPU (yen)	8,130	7,890	7,200	6,910	6,700
i-mode monthly ARPU (yen)	2,120	2,240	2,060	2,040	2,160

DoCoMo has provoked Japan's other wireless networks, KDDI and Softbank,[57] to each offer their own versions of i-mode (KDDI's is called "au,"[58] Softbank's "Live"). Entry into the wireless web "platform" space sparks competitive rivalry for the best network bundles. The original innovator, DoCoMo, responded not by abandoning coordination of its platform, but by extending it into e-commerce.[59]

The argument that unregulated cellular carriers will deny users valuable opportunities to access content and applications is, like the criticism of DoCoMo's "walled garden," overly simplistic. Skype's petition proposes to prohibit vertical restrictions that cellular operators might impose. The assumption is that such restraints are not a form of productive coordination, but categorically anti-competitive. The i-mode development underscores just how empirically lacking this view is. Network coordination facilitates a wide range of productive activity, furthering consumer interests.

[56] Data from NTTDoCoMo, http://www.nttdocomo.co.jp/english/corporate/ir/finance/annual/.

[57] Softbank acquired the assets of Vodafone Japan in 2006. Vodafone purchased J-Phone in 2001.

[58] For an analysis of KDDI strategy, see Atushi Matsumoto, *NTT DoCoMo 2003* (Charlottesville, VA: University of Virginia Darden School Foundation, 2003).

[59] See, e.g., Dan Einhorn, *DoCoMo's "New Business Model,"* BUSINESS WEEK ONLINE (April 19, 2004); John Boyd, *Here Comes the Wallet Phone*, IEEE SPECTRUM (Nov. 2005). DoCoMo also created the Mobile Society Research Institute to study how users interact with their mobile phones and to invent applications for making the phones more useful. Stephen McClelland, *Japan: A Future Mobile Society?,* TELECOMMUNICATIONS MAGAZINE (June 7, 2005).

V. CONCLUSION

The argument for a "wireless *Carterfone*" not only disregards the economic rationale for the real *Carterfone*, but categorically dismisses precisely the market forces that policy makers embraced when deregulating wireless telephone services 15 years ago. The market that has developed is not only unregulated, it exhibits a high degree of competitiveness as determined, and often re-affirmed, by the Commission itself. Wireless carriers are driven by economic self-interest to craft valuable networks, creating platforms with massive investments and wide-ranging rules characterized by some as vertical restraints. These create "ecosystems" for the delivery of valuable services to subscribers, who choose among the feature-rich packages offered by rival carriers. Where customers believe networks impose too much control – or too little – they are free to switch carriers.

And they do. Capital investors judge the worth of wireless networks, in large measure, by how successful they are in enlisting current subscribers to re-subscribe. When a network fails in this task, churn rates rise, stock prices fall, and network owners lose wealth. The market punishes carriers for disappointing consumers. Crucially, such disappointments can come in unlimited dimensions, and be the product of *overly lax* or *overly strict* network management. Finding the proper mix of rules – those that extend individual options while protecting shared network resources -- is a subtle balancing act. Firms with profit incentives are far more likely to discover the relevant trade-offs and to effectively implement optimal solutions than are government agencies imposing blanket rules at the behest of interested parties.

The wireless market coordinates a massive degree of complexity. Mobile subscribers have access to a diverse panoply of complementary goods and services; carriers have strong incentives to enable these applications whenever the cost to the network is exceeded by the benefit to its subscribers. This imposes efficiency constraints all around, producing an environment conducive to the discovery of spectrum sharing solutions that maximize the value of wireless networks.

It is notable that virtually all such firms impose rules that limit how individual subscribers may utilize their facilities. Even in the case of tiny WISPs lacking any market power, usage restrictions are a standard part of "acceptable use" policies. Non-profit organizations similarly impose governance rules to manage their networks. Competitive entrants into wireless broadband services today carefully manage their "ecosystems," imposing vertical restraints. These observed forms of market organization reveal the importance of network management. It also illustrates the straightforward, cost-efficient mechanisms that develop for dealing with potentially disruptive activities that could undermine valuable opportunities for all. To bluntly quash such market outcomes would stifle efficiencies and reduce the supply of wireless broadband services.

"Wireless *Carterfone*" would, furthermore, re-impose controls shown inferior to competitive market forces in the deregulation of wireless markets. To revive regulatory mandates long ago abandoned would disrupt the ability of wireless networks to craft their

packages, organizing investments, technologies, infrastructure, equipment, applications, business models, and customer service. It would render impossible the high degree of economic development that is on display in the wireless marketplace. To do so based on an analogy to rules imposed in a distinct context some four decades ago is to misunderstand the economics of the fixed telecommunications market then, or the wireless telecommunications market today.

Prof. Thomas W. Hazlett (March 2007)

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