

Sharing the Risks of Wireless Innovation

BY RICHARD BENNETT | OCTOBER 2009

Disrupting the system of investment that supports platform R&D in the name of handset unbundling is unlikely to accelerate the progress of wireless technology.

Since the advent of the Apple iPhone in 2007, many open networking advocates have consistently criticized Apple's practice of entering into exclusive marketing agreements limiting its use to particular cellular networks. This summer, a coalition of public interest groups and the Rural Cellular Association (RCA), a trade group comprised of smaller cellular operators, asked Congress and the FCC to enact rules banning this practice. The FCC has opened an inquiry into wireless competition and industry practices, including exclusive marketing agreements between carriers and handset manufacturers, and has asked for and obtained specific information from Apple, AT&T, and Google concerning Apple's apparent rejection of the Google Voice application for the iPhone and AT&T's refusal to allow Skype on its network. Apple's response indicates that the Google application is still pending and may be approved,¹ while AT&T has relented on the Skype ban. This set of issues—ranging from handset exclusivity to application store policies—generally falls within the scope of the “Wireless Carterfone” arguments devised by law professor Tim Wu and first offered to the FCC by Skype in 2007.² Recent statements from the FCC indicate that a regulation is forthcoming that will allow consumers to take handsets to competing networks at the end of their contract periods, a capability they typically enjoy today.³

SUMMARY OF THE ISSUE

Carterfone was the landmark 1968 FCC ruling abolishing arbitrary restrictions on the connection of non-harmful handsets and similar customer premises equipment (CPE) to the public switched telephone network in the United States. It was followed

by FCC actions defining the properties of the technical interface between the network and the CPE, and a certification program for CPE devices. Carterfone's principles of open access were echoed in the FCC's Internet Policy Statement of 2005, establishing the “Four Freedoms”



of Internet access. Perhaps emboldened by the Policy Statement, advocates seek to apply a Carterfone framework to cellular networks as well. The applicability of Carterfone principles, devised for a regulated monopoly, to the competitive cellular marketplace is not straightforward and has been questioned by respected economists such as Gerard Faulhaber, former Chief Economist of the FCC.⁴ The Apple iPhone, for all of its virtues, is not even the highest-selling smart phone in the United States, let alone a monopoly product.⁵ The market for cellular services in the United States features four nationwide competitors, a number of regional players including RCA members, and additional Mobile Virtual Network Operators (MVNOs, many of whom offer pre-paid plans). Large cities are typically served by 15 carriers, most of which are MVNOs.

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RCA claims that exclusive contracts between the four national carriers and high-profile handset manufacturers such as Apple, Blackberry, and Palm have left their members behind. They argue that consumers are harmed by agreements that bind particular wireless devices to specific networks, even for limited periods of time. This report examines RCA's arguments and the larger question of marketing arrangements and innovation in the wireless space.

SHARING THE RISKS OF INNOVATION

Historically, exclusive business arrangements between carriers and device manufacturers have been an important part of the American wireless marketplace. The traditional wireless handset was built to order for a particular carrier, according to a detailed specification provided by the carrier. Applications were generally supplied by the device manufacturer, but a small number came from third party mobile software specialists. These agreements enabled carriers to develop new network capabilities and to ensure networks were used efficiently. They also provided carriers a means to compete on the basis of features and functions rather than coverage and price alone, and to maintain predictable service revenues.

The relationship between handset manufacturers and carriers has been very different in the United States than in some other parts of the world, most notably Europe, where handsets and networks historically formed separate markets. European law once required wireless networks to use a common technology, GSM, a common set of frequencies, and a common Subscriber Identity Module (SIM card), while American and Japanese network operators have been free to use diverse technologies and frequencies with no SIM card mandate. These different regulatory models are hotly debated in both the United States and Europe, but often are not well understood.

The GSM mandate was repealed in Europe in 2007.⁶ Currently, EU law permits cellular operators to enter into exclusive marketing arrangements with handset providers, to subsidize consumer purchases, and to charge early termination fees to subscribers who cancel service short of contracted periods. At the end of a contract or after paying a termination penalty, European consumers are free to take their cell phones to competing networks, but so are most Americans, within technical limits. Hence, the real difference between United States and European cell phone regulatory and industry practices is the after-effects of the single-technology mandate.

As with the confusion over the current differences between European and American regulations, there is disagreement over which system is better for consumers. A recent OECD report claims that Europeans pay lower rates than Americans. This report, however, was based on hypothetical users rather than real ones.⁷ The OECD's methodology is flawed as it was confined to rate plans rather than actual patterns of usage. According to the OECD report:

It is important to note again that the OECD calling pattern in the basket can be significantly different than common calling profiles in a specific country. For example, the high-usage OECD basket includes 1,680 outgoing voice calls per year while users in the United States average 9,600 minutes of voice calls (combined incoming and outgoing) per year. In this case the basket provides the cost of buying exactly the calls and messages in the OECD basket rather than what may be considered a "typical" bundle in the market.⁸

The OECD researcher notes that a number of different low-usage plans are offered in Europe, while American plans offer more choices in the higher usage levels. When we examine actual patterns of usage, the results show that Americans pay lower per-minute fees than Europeans. This pattern is clearly shown in data collected by Merrill Lynch.⁹ Merrill also found that Americans consume more than four times as many minutes as the European average.¹⁰ Conforming claims about price and utility to real usage is important as we track the adoption of new technology.

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As mobile devices have become more powerful, application support has become increasingly paramount and distinct from mere physical handset support. General-purpose operating systems such as Linux, Windows, and UNIX© variants have moved into the mobile device space, customized mobile operating systems as Palm's Web OS have appeared, and mobile software libraries that ease the transition of applications across platforms have begun to emerge.¹¹ These developments have made it relatively easy for application developers to create mobile applications that can be made to run on a variety of handsets. Hence, the smart phone market is becoming increasingly dominated by competition between software applications rather than direct competition between hardware devices.

This is one reason why it's likely that exclusive marketing agreements between carriers and device manufacturers will soon decrease in importance. While once (and still) a vital means of sharing the risk inherent in innovation and pooling domain expertise between device manufacturers and network operators, their place in the competitive landscape will one day be occupied by loose relationships between application developers and mobile software architectures.

Wireless marketplace dynamics have changed substantially since the advent of the iPhone in 2007, such that premium device builders (like Apple, Palm RIM, and others) often wield more power than carriers. For

example, it's commonly believed that Apple collects a portion of the AT&T's iPhone-related revenue.¹² In the near future, we may very well see yet another shift in which applications themselves take the upper hand. If and when this happens, consumers will choose handsets and carriers on the basis of their ability to run applications, which will align consumer interests with those of application vendors.

At that stage, Exclusive Marketing Agreements between carriers and handset producers will be moot, as telephony will have become software. Policy makers should be wary of disrupting the evolution of the market for mobile applications and the platforms that support them, as competition is robust, innovation is vigorous, and consumers reap the benefits of these dynamics.

ARGUMENTS FOR A BAN ON EXCLUSIVE MARKETING AGREEMENTS

RCA and allies seek a federal ban on Exclusive Marketing Agreements (EMAs) between cellular carriers and device manufacturers. These are the agreements whereby the device manufacturer agrees to sell its particular device to only a particular carrier and the carrier agrees to market it. RCA and its allies argue that two legal precedents make the case for such a ban: Carterfone and a recent court decision banning exclusive arrangements between apartment owners and triple-play cable operators. In other words, apartment owners had to let competing triple play operators serve their tenants.

However, the cable analogy appears to be specious, as it relates to a specific order meant to enable more competition in the cable TV industry consistent with the FCC's stated policy. If the FCC had wished to create a European-style regulatory system for cell phones in the past, it surely would be conscious of this policy without a reminder from the court. Besides, in the current wireless market, consumers have choices between carriers and handsets, so the question is whether the choice is as broad as it should be.

The "wireless Carterfone" claim is much more interesting. In 2007, Columbia Law School Professor Tim Wu argued for the rule on the basis of carrier-induced "Application Stall" that allegedly prevented the development of mobile handset applications:

In fact, [carriers] have imposed excessive burdens and conditions on application entry in the wireless application market, stalling what might otherwise be a powerful input into the U.S. economy. In the words of one developer, “there is really no way to write applications for these things.”¹³

Given the fact that Apple iPhone users have access to more than 85,000 applications and users of other wireless platforms have access to several thousand in their own right, Wu’s “application stall” claim is clearly dated. The RCA complaint recognizes that applications have become so easy to write and deploy that they’ve become a principal driver of handset preference. In testimony at the Senate Committee on Commerce, Science, and Transportation’s hearing on EMA’s, RCA official Jack Rooney stressed the importance of applications in driving consumer preference for handsets:

For example, some leading education applications for medical professionals and students are only available to AT&T’s customers through the Apple iPhone. These applications and features are not available in many rural areas, even though smaller carriers serve those areas and are eager to provide the most advanced services there.¹⁴

While Rooney wants the iPhone on his network and similar ones, an important motivation is actually access to the applications that the iPhone runs. This suggests that the ultimate issue isn’t the binding of handsets to networks as much as the availability of applications. The difference may be subtle, but it’s profound. There is no EMA between the carrier and the application vendor and there is no technical or business reason that a typical iPhone application can’t be made to run on a Palm, Blackberry, or Windows Mobile device, given a software engineering effort. In fact, many of the most popular applications for wireless handsets run on multiple platforms already, such as Telenav (a turn-by-turn GPS navigator), Facebook, and Twitter.

MOBILE SOFTWARE PLATFORMS

For the application developer, the physical device is less important than the software platform, as the latter incorporates the Application Program Interfaces (APIs) to the device operating system and hardware that enable the application to run. Mobile software platforms are diverse and competitive, and are increas-

ingly designed to facilitate development of highly functional mobile applications. In the past, Microsoft and Research in Motion dominated the mobile software platform market; today Apple has taken a prominent position, and in the future Google Android, Linux Mobile, or Palm WebOS may be dominant. In addition to this robust competition between software platforms, there is an emerging market for software libraries that make it easy to port mobile applications across platforms, such as Khronos.¹⁵ Consequently, the market for mobile applications has come to resemble that for desktop applications: a highly robust and competitive market in which developers are free to target as many platforms as they wish.

85,000 applications have been written for the iPhone since Tim Wu complained of “application stall.”

The contradiction between Wu’s and Rooney’s assessments of the applications pool for wireless devices reflects the progress that has been made in mobile applications in the last two years. Each of their assessments was reasonably accurate at the time it was made, and the gulf between them shows how far we’ve come.

The mere fact that applications are now the focus of the mobile competition debate shows how far we’ve come from the Carterfone era, when applications weren’t part of the discussion at all. The Carterfone decision dealt with a network designed and engineered for the sole purpose of analog telephony, and with a class of devices that lacked the ability to run even rudimentary applications—simple, dumb telephones. It’s impossible to draw meaningful regulatory analogies between the market dynamics of analog telephony in the 1960s and those that surround advanced digital devices, such as the iPhone; this is indicative of the progress that has been made in the last forty years.

FREEZING WIRELESS INNOVATION

It’s worth bearing in mind that the effects of Carterfone were actually two-fold: while it opened Ma Bell’s network to a host of devices ranging from answering machines to modems, it also closed a significant portion of the network space to innovation by freezing an interface requirement into law. The telephones that

went on the market in the first year after Carterfone, 1969, still work on the telephone network of today, which is something that can't be said for a number of five-year-old wireless handsets.¹⁶ We expect wireless networks to improve, and this improvement comes at the cost of compatibility and interoperability. For example, many wireless carriers are rolling 4G services based on Wi-Max or LTE technologies.

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In order to be effective, a ban on handset exclusivity would entail restrictions at the interface between wireless networks and mobile devices, the effects of which can only harm the pace of innovation. We've seen this play out in Europe, where law once prevented carriers from using CDMA and other technologies that are more efficient and friendlier to battery life than GSM, and the outcome has been that advanced handsets are more rare. If all handsets are usable on all networks, a limited interface has to be defined between the handset and the network, and the effect of that limited interface is to reduce the richness of the interaction between the handset and the network. The Visual Voice Mail feature in the iPhone required a tweak in the device-network interface, for example. Under the all handsets-all networks principle, such a tweak would have to be approved by regulators before it can be deployed, otherwise it might not be implemented on all handsets. It is ironic therefore, that advocates of open access frequently claim to seek a regime that permits "innovation without permission." In fact, this is antithetical to extreme handset portability.

SMARTPHONES FOR CDMA NETWORKS

Wireless networks are built today on the basis of two competing and non-interoperable digital technologies, CDMA and GSM.¹⁷ CDMA networks use technology developed and licensed by Qualcomm, an American firm, while GSM networks conforming to the European mandate use technology developed in Europe by Ericsson. GSM is arguably more open, is cheaper to license, but is much less efficient to operate than CDMA.

GSM promoters claim 80 percent of the global market uses their technology, but CDMA in various forms is an essential part of 3G wireless networks worldwide. Arguably, most of the innovation in cellular begins on CDMA networks and migrates into GSM standards after it has been proved in the field; in a sense, GSM is a free-rider in a system where CDMA takes most of the risk of innovation.

The iPhone uses GSM, and related technologies such as GPRS, EDGE, and HSPA, while the networks operated by the RCA members who testified at the Senate hearing, United States Cellular and Cellular South, use CDMA. Consequently, it would take more than a ban on EMAs to bring the iPhone to RCA networks, it would require a new iPhone with CDMA hardware built in, or a change to the RCA networks which is unlikely (to say the least). As RCA members have not announced plans to convert their networks to GSM, we can only assume they expect Apple to produce a new iPhone for them. As Apple has not announced plans to produce a CDMA iPhone, it's unclear how the RCA complaint about being shut out of the iPhone application bonanza might be satisfied. It's certainly a larger issue than the nature of Apple's agreement with AT&T.

RCA members painted themselves into a corner by choosing not to adopt GSM. Rather than looking to the Apple iPhone for their salvation, they should pay more attention to smartphones built for CDMA networks, such as the Blackberry Storm and the Palm Pre. Both of these smartphones are currently subject to EMAs, but their vendors are motivated by the iPhone's success to seek broader markets in order to attract more application support. Verizon, for example, has indicated a willingness to allow handsets it finances for its own CDMA network to be freely used on networks of rural CDMA operators, and this is probably as close as the RCA will come to having their concerns satisfied.

If Congress were to adopt the European model of extreme handset portability, which at its heart depends on a single technology mandate, RCA members would be even less satisfied than they are today: the networks they operate are unlawful under the former European rules since they employ CDMA instead of GSM. The regulations RCA seeks would, under the most likely scenario, bankrupt the majority of the RCA membership.

LESSONS FROM THE PALM PRE

The Palm Pre is a much newer product that's captured a great deal of attention among mobile buffs and pundits. Sprint has apparently pinned its hopes for revitalizing its market share on the Pre, so it's probably unwilling to allow additional licensees in the near term, but Palm, also hoping to reinvigorate its bottom line, obviously has an interest in the broader adoption of its new software platform, possibly on different hardware.

The ability of small carriers to reap the benefits of the investments made by large carriers in new handsets probably will be enhanced in the future, as mobile innovation becomes more a function of applications than platforms.

The process that brought the Pre to market is instructive about the dynamics of mobile innovation. Before forming their partnership around the Pre, Sprint and Palm were both in dire straits, losing market share and earnings and suffering stock price erosion. In February, 2008, Sprint announced a \$29.5 billion loss for the preceding quarter (caused by declining Average Revenue per User (ARPU) and an eroding subscriber base), and the imminent layoff of some 4,000 workers.¹⁸ Palm lost \$95 million in its 2008 fiscal year. While the companies had long partnered to bring innovative smartphones to the market, they were battered by the iPhone, which made the Palm Treo line look dated. Their reaction was to invest in a better phone, improve network coverage, and innovate their way out of their respective crises. Palm secured a \$325 million investment from Elevation Partners (at the cost of 25% of the company),¹⁹ Sprint invested billions in network upgrades, and both courted application developers. Early reports deemed the Pre launch a success²⁰ and stock prices rebounded for a time. However, recent reports indicate that the Pre has not prevented Sprint from losing subscribers, so the assessment has been reversed and Sprint is now rumored to be a takeover target. In the best-case scenario, it will simply take longer for the Pre to build a developer community than anticipated; the takeoff of the iPhone wasn't immediate either

Similarly, Google's attempt to establish a beachhead for its search and advertising business in the wireless

space has been less than successful. There are currently two Android products on the market, neither of which has generated significant sales, with several others rumored to be in the wings. At this point, no one can call Android a success, although both the Pre and Android could rebound and gain market share; Google and Verizon have just announced an agreement to bring the Android platform to the Verizon network, for example.

The takeaway from the Palm Pre and Android experiments is that innovation is not without risk. It may take several more experiments before technology producers develop the system that outperforms the BlackBerry and iPhone platforms in the marketplace.

Successful innovation in wireless platforms has obvious consumer benefits, as it may prevent smaller carriers such as T-Mobile and Sprint from leaving the cellular business or merging, thus preserving platform competition. Such outcomes bring the benefits of competition to consumers for years to come in the form of lower prices, better services, and a richer pool of applications. None of this happens if carriers and smart phone producers don't agree to share the risk inherent in producing new systems based on new paradigms.

CONCLUSION

Ultimately, it's likely that WebOS, Android, and the iPhone in some form will be available on rural CDMA networks, just as many BlackBerry and Windows Mobile smartphones are today. This won't happen as fast as operators would like, but at a pace consistent with the investment dynamics of the innovation economy as a whole. The ability of small carriers to reap the benefits of the investments made by large carriers in new handsets probably will be enhanced in the future, as mobile innovation becomes more a function of applications than platforms. We're not there yet, but disrupting the system of investment that supports platform R&D in the name of handset unbundling is unlikely to accelerate the progress of wireless technology.

Complaints about the bundling of handsets and networks are more a side-effect of a particular regulatory point of view than an unbiased response to the facts. One regulatory constituency has been too heavily influenced by the notion that network systems are functionally layered systems in which each element must be

firewalled from every other element in order to function correctly; this is a misreading of early models of network protocol architecture. Advocates of this approach insist that elimination of handset subsidies, for example, increases consumer choice and reduces price. The facts don't support this claim, as the European Union, which once imposed a single-technology mandate following a functional separation model, still features higher per-minute cellular prices and less handset and technology choice than we have in the United States. In reality, the wireless handset is part of the wireless infrastructure, not merely an appendage to it as the analog phone is to the wireline circuit-switched network; you can't improve one part of the wireless system without improving the other. The cellular network

is an end-to-end system, not a "dumb device" network like the public switched telephone network (PSTN).

The focus of wireless innovation has shifted in the past year from hardware platforms to software applications, and small network operators would be well-advised to heed that fact. They can increase the appeal of the existing Windows Mobile and Blackberry handsets engineered for their networks by working with application software vendors to port their products to the rural networks, and they can make their networks more appealing by developing programs to woo new applications. In a wireless market in which applications compete against each other, the lack of hardware portability is a much smaller problem than it may appear.

ENDNOTES

1. On June 3, the Rural Cellular Association filed a Petition for Rulemaking with the FCC regarding contracts between large wireless carriers and handset manufacturers. The Senate Committee on Commerce, Science, and Transportation held a hearing on the subject on June 17th. On June 18th, former Acting FCC Chairman Michael Copps announced that the FCC would open a proceeding to examine the charges. The RCA sought a Senate review of the same issue in May 2008, and the House Subcommittee on Telecommunications addressed the iPhone contract question in 2007 and took no action. The FCC announced a Notice of Inquiry into wireless industry practices on August 23, 2009.
2. Tim Wu, “Wireless Carterfone,” *International Journal of Communication*, Vol. 1 (2007): 389; Columbia Public Law Research Paper No. 07-154. Available at SSRN: <http://ssrn.com/abstract=962027>.
3. Cecilia Kang, “My Chat With the FCC Wireless Chief Ruth Milkman,” Blog, *Post Tech* (October 14, 2009), http://voices.washingtonpost.com/posttech/2009/10/my_chat_with_ruth_milkman_fcc.html?wprss=posttech.
4. Faulhaber argues that regulation is a poor substitute for competition as an engine of consumer choice. See: Gerald R. Faulhaber, “Policy-induced competition: The telecommunications experiments,” *Information Economics & Policy*, Vol. 15 (2003): 73-97. Available at: <http://rider.wharton.upenn.edu/faulhaber/Policy-Induced%20Competition.pdf>.
5. Ben Charny, “RIM’s BlackBerry Curve Outsells iPhone in Quarter,” *Wall Street Journal* (May 6, 2009), <http://online.wsj.com/article/SB124146767425784427.html>.
6. “Europe Repeals GSM Mandate,” *Current Telecom Developments* (web newsletter) (July 27, 2007), <http://www.paulweiss.com/files/Publication/b5bd1dc3-c427-4a1e-9fe8-2290e243ad71/Presentation/PublicationAttachment/ecc2aff9-9ef0-4b00-bdae-2c5820d6c734/CTD7-27-07.pdf>.
7. Organization for Economic Cooperation and Development. *Mobile phone calls lowest in Finland, Netherlands and Sweden, says OECD report*. Paris: OECD, August 11, 2009. http://www.oecd.org/document/20/0,3343,en_2649_201185_43471316_1_1_1,00.html.
8. *Ibid.*, 275.
9. Glen Campbell, et al., “Global Wireless Matrix 4Q08,” Merrill Lynch, April 13, 2009.
10. “The United States and World Wireless Markets: Competition and Innovation are Driving Wireless Value in the U.S.,” CTIA, May 2009 FCC filing, http://files.ctia.org/pdf/filings/US_Wireless_Industry_and_the_World_Ex_Parte.pdf.
11. Google Android is a Linux-based system. Apple’s operating system is a Unix variant.
12. AppleInsider, “AT&T revenue to highlight Apple’s fiscal fourth quarter,” http://www.appleinsider.com/articles/07/10/17/iphone_att_revenue_to_highlight_apples_fiscal_fourth_quarter.html.
13. Wu, “Wireless Carterfone.”
14. Testimony of Jack Rooney, President and Chief Executive Officer U.S. Cellular, Senate Commerce, Science, and Transportation Committee Hearing on *The Consumer Wireless Experience*, June 17, 2009, http://commerce.senate.gov/public/_files/RooneyTestimonyConsumerWireless.pdf.
15. See: <http://www.khronos.org/>
16. It’s interesting to note that the ARPANET was first deployed in 1969; in some sense, the concretization of the telephone network may have helped spur the adoption of a network more friendly to technical progress, the Internet.

17. Code division multiple access (CDMA) and global system for mobile communications (GSM).
18. Jeremy Kirk, "Sprint Nextel bleeds \$29.5 billion, keeps losing customers," *Infoworld* (February 28, 2008), <http://www.infoworld.com/d/networking/sprint-nextel-bleeds-295-billion-keeps-losing-customers-805>.
19. Kara Swisher, "Roger McNamee on \$325 Million Palm Investment," *Boomtown*, <http://kara.allthingsd.com/20070608/roger-mcnamee-on-325-million-palm-investment/>.
20. Larry Dignan, "Analysts deem Palm launch a success; Pre inventory replenishment eyed," *ZDnet* (June 8, 2009), <http://blogs.zdnet.com/BTL/?p=19374>.

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