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The iPhone

Hacking and Cracking and Copyright

BY CHRISTINA SCELSI

Apple's iPhone was among fall 2007's most anticipated technological releases. As is known, the device merges the popular iPod with cellular phone and mobile computing technology. The buzz surrounding the release of the iPhone not only involved the technology itself, but also if and when the new technology contained on the iPhone would be cracked by hackers. Indeed, just two months after its June 2007 release, the world learned that teenager George Hotz successfully cracked the iPhone. In so doing, he made it possible to use the device on any cellular service provider's network, opening the door for consumers interested in the iPhone, but not necessarily interested in switching to AT&T service. He also opened the door to international consumers to use the technology.¹ The successful hacking of the iPhone presents a number of questions as to how such knowledge will be utilized in the marketplace, as well as whether doing so is permissible under the Digital Millennium Copyright Act ("DMCA"). Furthermore, the new iPhone interface and the ability to purchase music through its Wi-Fi feature present great promise for the growth of the mobile music market, in the form of both new music stores and devices.

BACKGROUND

iPhone

It is commonly known that the iPhone combines a number of devices into one, including a cellular phone, mobile Internet, a digital camera, and the functions of an iPod. And it features a highly touted touch screen interface that allows users to complete a variety of functions, from dialing phone numbers to composing e-mail messages to manipulating various other menus, all by using taps and strokes of the finger. Initially, Apple introduced the iPhone in four- and eight-gigabyte versions, but discontinued the four-gigabyte model after only two months. Among its software features are Bluetooth functionality, Wi-Fi compatibility, e-mail, as well as audio and video playback.²

The iPod feature of the iPhone represents the future of the stand-alone iPod, as illustrated by Apple's subsequent introduction of the iPod Touch, which includes the interactive touch screen, as well as the ability to download songs from iTunes through the Wi-Fi connection.³ In addition, the "Cover Flow" feature of the iPhone's iPod allows the listener to experience music in a fashion more akin to looking through one's own music collection by displaying album covers one after the other. The Cover Flow function, previously available on the personal computer version of iTunes, is now available, and even improved by the superior display of the handheld device on the iPhone. As part of the integration of the iPod into the iPhone, the latter features an integrated speaker that allows users to listen to music without headphones, and keeps the headphone volume independent of that for the speaker, preventing unpleasantly high volume levels when switching from the speaker to headphones.

The device's limitations in terms of service providers and applications are driving attempts to unlock the iPhone. First, the iPhone is currently only available in the United States and Europe, with Apple reportedly making deals with providers T-Mobile, Orange, and O2 for other markets, including Asia.⁴ Second, service for the iPhone is reportedly limited to the AT&T wireless network, with whom Apple is believed to have a five-year exclusive contract.⁵ Because the iPhone has only been available for less

than a year, and most consumers purchase their phone as part of a two-year contract, the typical unlock codes given out by some providers at the end of a contract are over a year off. Accordingly, they are driving the interest in unlocking the iPhone for use on other networks.⁶ Interestingly, the only other U.S. wireless provider whose network is currently compatible with the network technology in the iPhone is T-Mobile.⁷ And there is great interest among users in creating applications for the iPhone, as many have done with their Apple computers. Finally, the limitation of the iPhone's use, both geographically and in terms of providers, has not only frustrated consumers, but also caught the interest of Congress as a potential antitrust violation.

Hacking

While George Hotz's hacking of the iPhone was the most high profile of such attempts, his was neither the first nor the only way in which the iPhone has been cracked. In fact, Hotz himself as well as other groups have used a number of different methods to hack the iPhone.

The earliest of the successful attempts to crack the iPhone came from computer security researcher Charlie Miller at the annual meeting of the computer security group Black Hat on August 3, 2007. In describing the method he and his team used to crack the iPhone, Miller pointed to a number of idiosyncrasies that exist within the Mac platform, which ultimately make Apple computers and devices like the iPhone more vulnerable to hacking and other security infiltrations. Miller used a hacking technique known as "fuzzing" to crack the iPhone, which loads large amounts of code on to the system to force it into being compromised through analysis of the crash reports to find the best method to infiltrate the system. While this method was effective, Miller subsequently advised Apple of the security flaw and the company has since released a patch to resolve the issue.

Other methods used by groups such as UniquePhones.com and

iphoneSimFree.com involve either changing out, or using software, to reprogram the Subscriber Identity Module (SIM) chip. The dissemination of information about how to unlock the iPhone through these methods was largely halted due to the threat or fear of either Apple or AT&T pursuing their legal remedies.

The original method utilized by George Hotz involved a 10-step process. That process includes opening the iPhone, replacing the SIM chip, soldering its wiring, and using software to erase and then patch the firmware on the iPhone to ultimately bypass the AT&T network. Because the process took Hotz well over 500 hours to unlock two iPhones, industry experts feel that this method is likely too complicated for most consumers. Instead, it might only appeal to hard-core hobbyists and, thus, it is viewed as not likely to be a threat to Apple in the long run. However, Hotz's work made a significant mark in terms of showing the vulnerabilities of the iPhone. It also garnered him a consulting job with mobile phone repair company Certicell, three iPhones, and a Nissan 350Z in exchange for the two unlocked iPhones. As part of the college freshman's consulting duties, he will train the company's staff on unlocking the iPhone for technical support purposes. Certicell spokesman Jake Ducey has confirmed that the company has no interest in commercializing Hotz's method.

The Web sites for Apple and AT&T both address the question of whether users can change or alter the SIM chip provided in the iPhone, and both companies encourage the use of the preinstalled chip. However, in light of the iPhone's recent hacks, many wonder if those hackers have sufficiently pressured Apple and AT&T to result in a user-friendly method of changing the SIM chip so that it may be used on any network.

Another technological wrinkle in the introduction of the iPhone relates to the creation and downloading of user-created, non-Apple software for the device. Such software remedied some of the users' initial gripes with the iPhone, such as the inability to create their own

ringtones. In September 2007, Apple released a software update that undid many of the attempts to unlock the iPhone, turning such devices into what were deemed "iBricks" after the update rendered them nonfunctional and many non-Apple programs inoperable, both of which were met with user outcry. Recently, however, Apple changed course and announced the introduction of a software program that will allow users to create programs for the iPhone, as it has allowed with its computers and other programs. While it seems likely that not only will the iPhone continue to break sales records, but also that hackers will continue to attempt to crack the device, the larger looming question is what the legal ramifications of sharing and even selling such information will be for providers.

LAW

The central question of whether hacking the iPhone is legal is whether doing so falls into the exception set forth by the Copyright Office Rules or if it is prohibited under the Digital Millennium Copyright Act. Further, the introduction of the iPhone has uncovered other legal issues, including the question of whether Apple's exclusive relationship with AT&T presents a violation of antitrust laws.

DMCA

Under 17 U.S.C. § 1201, the circumvention of copyright protection systems in video game systems and cellular phones is prohibited, save for educational and research purposes.⁸ This includes attempts to "avoid, bypass,

APPLE'S UPDATE UNDOED ATTEMPTS TO UNLOCK THE IPHONE, TURNING THE DEVICES INTO "iBRICKS."

remove, deactivate, or impair a technological measure without the authority of the copyright owner."⁹ Because this provision has been used to prosecute individuals undertaking similar unlocking activities with video game systems and DVD copying code, it also might apply to the unlocking of iPhones. Thus, it is important to consider the exemption for cellular telephones recently enacted by the Copyright Office and how it will ultimately apply in the iPhone context.

Copyright Rules Exception

Given the state of the DMCA under section 1201, George Hotz and the other groups who have hacked the iPhone may have violated the provision. However, in 2006, the Copyright Office created a three-year exemption to the DMCA provision, allowing individual consumers to take apart their cellular phones in order to use the devices on other networks.¹⁰ Specifically, the Copyright Office rules under part 201 create an exception to the anti-circumvention provisions in section 1201 "for the sole purpose of lawfully connecting to a wireless telephone communication network."¹¹ This exception, however, is limited to individuals seeking to enable their phone to work on a specific network and does not apply to those individuals or companies seeking to profit from unlocking the technology.¹²

The exception has not been interpreted consistently. Some believe that the Copyright Office exemption is not clear. Thus, actions such as unlocking the iPhone and then posting such information online would probably fall into the exception and would protect the hacker from legal consequences.¹³ However, others analogize iPhone hacking to the successful prosecutions by the movie industry for secondary copyright infringement against hackers who posted

and distributed the DeCSS code that allows the copying of DVDs. Those following that school of thought conclude that iPhone hacking could result in liability under section 1201 of the DMCA.¹⁴ There is also disagreement as to what the potential liability of parties trying to sell such information would be under the exception, which seems to depend on whether the information merely provides instruction as to how to unlock the device or provides the actual software that unlocks the phone for the consumer.¹⁵

Antitrust Problems

The exclusive relationship between Apple and AT&T in providing service for the device presents another wrinkle in the excitement surrounding the introduction of the iPhone. While this relationship is viewed as a drawback to the iPhone by consumers reluctant to switch providers, it also has drawn the attention of Congress as a potential antitrust violation.¹⁶

The July 2007 hearings before the House of Representatives Subcommittee on Telecommunications and the Internet were referred to by some as the "iPhone hearings," because the device's recent introduction was central to the topic of improving the U.S. wireless markets in terms of innovation and competition.¹⁷ Professor Timothy Wu of Columbia Law School testified that the iPhone scenario demonstrates the need for new wireless policy that would end locking consumers into long wireless contracts and blocking them from bringing their existing devices to new carriers.¹⁸ Representatives of the wireless industry testified to the contrary, describing the iPhone as an example of

APPLE AND AT&T'S RELATIONSHIP HAS DRAWN ATTENTION AS A POTENTIAL ANTITRUST VIOLATION.

improving competition, given the device's effect in driving other carriers to introduce new and better phones and services to compete with AT&T.¹⁹ It remains unclear whether AT&T's competitors will bring antitrust claims against Apple and AT&T. Meanwhile, it appears that the iPhone, and the exclusive deal between Apple and AT&T, could have an impact on future policy. Such repercussions could include effects not only on wireless policy but on that of mobile entertainment devices and services generally.

BUSINESS EFFECTS

Wi-Fi iTunes and the Music Industry

A significant feature of the iPhone is the Wi-Fi feature and its ability to allow users to browse and purchase music wirelessly from the iTunes Music Store. Apple also has integrated this feature into the new iPod Touch, which features the same sleek touch-screen interface as the iPhone. As the leading digital music store with more than 70 percent of the digital music market, the expansion of iTunes beyond the personal computer to the mobile market has many in the music industry hoping that it will boost lawful music purchases, which have struggled to grow in recent years. Despite declining sales of music and its exclusively online presence, iTunes is now the third largest retailer of music behind Wal-Mart and Best Buy.²⁰

Competing Music Stores and Models

The iPhone is setting a new precedent in wireless devices in terms of its integrated interface, particularly for mobile music. Accordingly, a number of entities are jockeying to develop music stores to compete with iTunes so they can obtain a piece of this market. Warner Music Group chairman Edgar Bronfman has praised the iPhone for its interface, as he feels "the lack of really outstanding user interfaces" on other devices has

prevented the mobile music market from developing beyond its current state.²¹ With the new interface providing opportunity for the growth of mobile music, the industry seeks not to obviate the new technology, but to emulate it. Indeed, both Amazon and Universal Music seek to compete.

Sporting more than 2.3 million songs that can be downloaded without digital rights management ("DRM"), the Amazon music store entered the marketplace with a bang. The sale of tracks without DRM was among the notable features of Amazon's venture, as it allows these tracks to be played on any device that a user chooses, including the iPod and iPhone. Buyers have the choice of buying songs one track at a time, burning their purchases to a compact disc, or using the Amazon MP3 software to transfer the music to iTunes or a Windows Media Player library.

Amazon also is taking on iTunes. The Amazon edge is its pricing—regular tracks are 99 cents, the top 100 selling songs are 89 cents, and albums are priced from \$5.99 to \$9.99. Though the offerings by Amazon are only about a third of what is available on iTunes, Amazon features tracks from major labels Universal Music Group ("UMG") and EMI Music, in addition to a number of independent labels. Perhaps the most notable offering available on Amazon.com are tracks by Radiohead, who had been among the major holdouts from the digital market. With the DRM-free tracks opening the door to a broad range of devices, including the iPhone, the Amazon music store seems poised to take a bite out of Apple's share of the digital and mobile music market.

Total Music, a venture spearheaded by UMG, also is poised to compete with iTunes. The venture would involve adding a subscription fee to a consumer's cellular phone bill or the price of a device that would pay for music, which would be provided on an all-you-can eat basis. UMG has approached Sony BMG Music Entertainment and Warner Music Group regarding

some form of partnership in the venture—such a partnering would represent control of about 75 percent of the music sold in the United States.²² UMG is also in talks with wireless carriers and device manufacturers for the same. In August of 2007, Doug Morris, head of Universal, announced an upcoming three-month test at Wal-Mart, Google, and Best Buy whereby music downloads that can be played on any player, including iPods and iPhones, will be sold. Morris' goal with Total Music is to change consumer perception of music to something of a utility—like water or electricity.

One purpose of the Total Music venture is an attempt by the record labels to recover a bigger share of the sale of digital music. Today, Apple currently receives 29 of the 99 cents per track that Apple sells. The record labels would like to see that share proportionally corrected so that labels and artists would receive more of it.²³ Morris is a proven, successful negotiator. He specifically negotiated one dollar from Microsoft for each sale of a Zune music player. Thus, with him at the helm of Total Music, it seems that Total Music might become a viable competitor to iTunes in the digital and mobile markets.

In addition to the music stores developed by record labels and content owners, a number of music store ventures are also in development by wireless carriers. For example, AT&T and Verizon use two different models for selling music on wireless networks.²⁴ In the case of AT&T, the company relies upon preexisting music stores such as eMusic and iTunes rather than building its own.²⁵ AT&T is in a position to do so due to its exclusive service for the iPhone, which features wireless accessibility to such services not currently available on other phones.²⁶ AT&T's model is aimed at bringing users of personal computer-based music stores into wireless downloading through devices like the iPhone, much as Apple is aiming to attract fans of its iPod to the new device.²⁷

In contrast, Verizon has opted to build its own VCast music store

and is hoping to drive traffic from wireless devices to the PC version of its store.²⁸ Verizon is hoping to build its model on its recent exclusive licensing deal with AC/DC, a band that has been largely absent from the digital music scene until now.²⁹ The company may face challenges on this front in that the band is only willing to sell albums wirelessly rather than individual tracks, meaning that the tracks cannot be sold on mobile phones and hence will only be available on the PC version of the store.³⁰

Rival provider Sprint also opted to build its own music store, making it among the many companies competing with AT&T for the latest technology, and having the most subscribers for its music services.³¹ Also among the competitors unveiling new phones and services is Nokia, which recently introduced its Ovi digital music service to work with its music-enabled mobile phones.³²

Competitors also are going global. While initially limited to the European market, Nokia's phones and service could give the company a foothold in the region, where the iPhone did not immediately infuse the market.³³ Motorola also has introduced a new version of its Q smart phone that is music-centered, which the company is promoting as a mobile entertainment device.³⁴ Indeed, the mobile music market is alive and well in Europe and Asia.

The great potential to increase mobile music sales through new devices like the iPhone promises to drive the development of new online music

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stores and other ventures. Whether these new ventures will be able to dethrone iTunes remains to be seen. But, should the mobile music market live up to its promise, there may be room for several services. Furthermore, the rise in DRM-free services has put pressure on iTunes, which subsequently introduced tracks without DRM and has begun promoting its iTunes Plus as the largest DRM-free catalog available online. The rise in DRM-free services also may open up the market to devices other than the currently market-dominating iPod. If that happens, it may pressure Apple to rethink its strategy to maintain its share of the digital music market.

CONCLUSION

The introduction of the iPhone presents novel legal and business questions—time will tell what their consequences will be. The excitement surrounding the release of the iPhone and the sale of one million devices in its first three months alone demonstrate the consumer demand for an integrated multimedia device that incorporates the features of the popular iPod. Further, the flurry of hacking attempts displays the interest in not only the technology, but in making the iPhone available for use on any network, in any country. As consumer demand largely drives the world of digital music services, it is entirely possible that Apple may change its intended course for the iPhone to cater to its market and maintain and expand sales. In the alternative, it may have to continue to resolve the issues presented by tech-savvy hackers.

Consumer demand for products such as the iPhone is also already on track to impact the future policy of the wireless market and may drive providers to allow consumers greater freedom in terms of device portability and selection. However, the future of the iPhone and the wireless industry hinges in large part on the interpretation of laws such as the Copyright Office exemption to the DMCA and whether the sharing of information about

unlocking devices such as the iPhone will result in liability for those doing so. Whether the new interface and Wi-Fi music purchasing capabilities will catalyze additional growth in the mobile music market in the United States also will affect the future of this industry. Among the many questions surrounding the iPhone, one thing is clear: The iPhone has made a resonating impact across many facets of the industry and its technology and competitors will continue to do so for some time.

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