POLICY / CIVILIZATION & DISCONTENTS

Owning the stack: The legal war to control the smartphone platform

The Smartphone Wars have now become an all-out legal battle, with copyrights, …

James Grimmelmann - Sep 12, 2011 1:00 am UTC

Photograph by Aurich Lawson

In the last few weeks, the smartphone industry appeared to produce more lawsuits than phones. Apple briefly managed to stop the sale of the Samsung Galaxy Tab 10.1 in all of Europe, and is now going after the whole Galaxy line. Back Stateside, Google first complained that Microsoft and Apple were using "bogus patents" to target Android, then spent $12 billion for Motorola and its patent arsenal. These are big, high-stakes fights—and the last company left standing may walk away with control over nothing less than the smartphone market itself.

In the flood of stories about tactical filings and counter-filings, it's easy to get lost in the details. But step back and it's clear that the Smartphone Wars aren't just a war of all against all; there's an underlying logic to these disputes. Most companies are fighting to control one part of the hardware-software stack, then use that control to pry money free from the layers above them.

But the *really* big players—the Apples and Googles of the world—are fighting over the stack itself. Their combat arena: the global legal system.

Meet the stack

A smartphone's "smarts" require plenty of tech. Think about all the layers that come together so that you could play Angry Birds on your iPhone:

- The **app** itself: Rovio's Angry Birds
- The **operating system** that supports downloadable apps: Apple's iOS
- The **device** that runs the OS: the iPhone, also by Apple.
- The **cellular network** that the device connects to: AT&T or Verizon in the US

These different parts make up a *stack*: layers that fit together, each one on top of the next, to do cool things for users. Good combinations sell well, making money for the participants. Everyone wants to be part of a winning stack, but even better is to be the bottleneck in a winning

stack so that everyone else can join in only on your terms—and at your price.

Enter the law. Players in the Smartphone Wars use lawsuits and threatening letters on law-firm letterhead to secure the ground on which they stand, or to cut the ground out from beneath someone else, all seeking to secure or bolster their place in the stack. There are three kinds of plays:

- **Horizontal** plays are disputes between players at the same level in the stack. The goal is to keep a competitor from imitating you too closely. When app developers copy each others' names, icons, and artwork, that's a horizontal issue: they're competing for the same consumer dollars by doing the same kind of thing a little too slavishly. The law here—primarily copyright, trademark, and patent—is all about balance. With weak protections, copycat ripoff artists come out of the woodwork; with strong protections, the problem is trolls.

- **Vertical** plays try to seize control of the stack from the players above (and sometimes from the players below). Think about the iPhone's anti-jailbreaking features, which are designed in part to ensure that no one puts an app on an iPhone unless they pay Apple's 30 percent toll. This is a subtle game; companies want to be open enough to be part of a rich and vibrant stack, but closed enough to capture value from the other layers. Copyright and the DMCA do a lot of work here, with antitrust increasingly pushing back against them.

- **Strategic** plays target an entire stack. The all-out patent wars now coming to a boil are strategic: if some of Apple's lawsuits succeed, the whole Android stack could end up toast. There are also plays here designed not to shut down a competitor but to hold a stack upside down and shake it until all the money falls out. Patents are the preferred weapon here. Since there's no "independent invention" defense, a well-aimed patent barrage can land without warning and leave nowhere to hide.

So here's the plan: we'll start at the bottom of the stack and move up, looking at the horizontal and vertical plays taking place at each level. Then we'll circle back and look at the all-out assaults on the different competing stacks.

Controlling the Network

Vertically, life at the network layer is regulated by the Federal Communications Commission. The FCC allocates blocks of spectrum to the carriers, usually by auction. In order to start running a cellphone network, you need to persuade the FCC either to make more spectrum available (which doesn't happen often but may be in the works through a reallocation of the UHF TV spectrum) or buy access from someone who has spectrum already. At the moment, the four biggest US networks are run by Verizon, AT&T, Sprint, and T-Mobile (AT&T's proposed merger with T-Mobile has run into trouble over fears that it would lead to too much concentration and too little competition.)

Horizontally, the carriers have been known to throw some sharp elbows at each other in their cutthroat competition for subscribers. In 2009, AT&T sued Verizon over Verizon's "There's a Map for That" commercials making fun of AT&T's lackluster 3G coverage. A judge sided with Verizon in the first round of skirmishing, and the companies quickly settled after that.

Controlling the device

Moving up to the device layer, let's start with vertical controls by the network operator over devices. Most often, whoever owns a block of spectrum can set whatever rules they want about who can use it and on what terms. One partial exception is the "700Mhz block," which was auctioned off in 2008. Google entered the bidding and forced the price up enough to trigger open access rules allowing consumers to use devices and applications of their choice. Google—whom we'll meet repeatedly as we reach the higher layers of the stack—is concerned that anyone with too much control at a lower layer could use that control to squeeze free some of the cash pouring out of its search advertising

money machine by threatening to cut off access unless Google pays up. (This same fear of being squeezed drives Google to support network neutrality, albeit half-heartedly.)

The traditional model in the industry was that carriers would use their more-or-less absolute lock on the network to take the upper hand in negotiating with device makers over which phones would be available on which networks. The only way for device makers to fight back was to have a truly compelling phone that users would actually switch carriers to use. RIM pulled it off with the CrackBerry, then Apple managed to talk Cingular/AT&T into unusually generous terms, including higher-than-usual subsidies for the iPhone and more control over iPhone packaging and sales. Another alternative for device makers is to route around the carriers by going WiFi-only: the iPod Touch is effectively a "phone-less phone."

Unsurprisingly, carriers also want to convince customers—willingly or unwillingly—not to switch networks once they have the phone, which means taking a little control over the phone itself. Early termination fees, backed up by contract law, are the first line of defense. But there's also a technical angle. Locking is an antifeature that keeps the phone from working on any other network. Presto: the cost to switch carriers has just gone up by the price of a new phone. For this reason, there has always been a thriving business in unlocking cell phones and in telling other users how to unlock them. And that doesn't make the carriers happy. Tracfone, a cellphone company that sells prepaid by-the-minute plans, started suing retailers who unlocked its phones for a violation of the DMCA. (The "copyrighted work" in question is the software on the cell phone itself.) This led the Library of Congress to exempt unlocking from parts of the DMCA in 2006 and again in 2010. Tracfone, though, has kept on suing unlocking retailers, and has even won despite the exemption.

Horizontally, there have been some fairly silly lawsuits over phone names. Would you have thought that Motorola's DROID should get a license from George Lucas? Or that ANDROID itself might step on the toes of Android Data's rights? (A judge held that it didn't.) Would a phone-buying consumer think that Google's NEXUS comes from the estate of Philip K. Dick? Google also had trouble with a similar mark from a telecom company; Google's successful defense was that tons of other computer and telecom companies use NEXUS (not exactly the best defense of Google's own trademark rights in the word). More recently, Motorola has been sued by Xoom Wireless over the XOOM. You might also remember the BLACKBERRY vs. BLACKJACK dispute, or the brief Cisco-vs.-Apple fight over IPHONE.

Controlling the operating system

Some device makers roll their own operating systems, like RIM with BlackBerry OS and Apple with iOS. Others pay to license an OS like Windows Phone for their own hardware. Google's Android is an interesting twist on the latter model; the software is open source and the license price is $0. Once again, Google is determined not to let its search business be outflanked by a lower-layer play; widespread availability of Android is a way of keeping any other software maker from locking up the operating system layer. Then again, Google's proposed purchase of Motorola may be a blow to the licensing system; it's hard not to imagine that Motorola would quickly become Google's preferred partner. Antitrust scrutiny of the merger is a "given"; the deal includes a whopping $2.5 billion breakup fee if Google fails to close the deal because of antitrust problems.

Much like at the network layer, the vertical question here is how a device maker keeps users tied into its preferred operating system once they have the phone. Just as at the network layer, the first line of defense is technical: the phone comes with firmware that prevents the user from installing unapproved software, hence the jailbreaking wars. (To be precise, an "unlocked" phone can work on other networks, while a "jailbroken" phone can run unapproved software.) The device makers have tried to make jailbreaking hard, with decidedly limited success—to the point that Microsoft simply gave up and approved a Windows Phone 7 jailbreaking tool. They've also tried to make jailbreaking unappealing by trying to disable features on jailbroken phones, by blowing away jailbreaks with software updates, and by muttering about how it will "degrade the experience" and void your warranty.

And just as in the network layer, the second line of defense is legal: the OS owner can use the DMCA and copyright law to fight jailbreakers. The Electronic Frontier Foundation, recognizing this possibility, asked the Library of Congress to create a DMCA exception for jailbreaking phones, which the Library did in 2010 over Apple's objections. Apple and AT&T are also facing an antitrust lawsuit over the iPhone's anti-jailbreaking features, which may end up foundering on the shoals of the Supreme Court's decision to uphold the clause in AT&T's subscriber agreement requiring arbitration rather than lawsuits.

Android puts some interesting twists on this back-and-forth. Google likes to emphasize Android's open-source bona fides. In Android head honcho Andy Rubin's words:

> the definition of open: "mkdir android ; cd android ; repo init -u git://android.git.kernel.org/platform/manifest.git ; repo sync ; make"

His point is that since Android comes with source code, you're not locked into the decisions that Google has made: you could whip up your own version of Android in between the "sync" and "make" steps.

That's the theory, anyway. The practice is a little trickier: Android is not a completely IP-free zone. For one thing, the basic Android OS may be open-source licensed, but Google bundles it with proprietary components, like its own Maps application. Would-be developers are faced with the hassle of disentangling the one from the other. For another, Google has started slow-walking its public releases of actual source code. The practical result is that Google knows things about Android that others don't, which gives it an edge.

Trademark is also part of Google's Android strategy. You can't use the ANDROID trademark unless you pass compatibility requirements, which include complying with a 25-page requirements document and passing a test suite. One company, Skyhook Wireless, has alleged that Android compatibility is a vague standard that Google manipulates at will to squelch competitors. Skyhook turned up an e-mail from a Google manager saying that compatibility was a "club to make [device makers] do things we want." (In court, Google won the first round and lost the second; the case is ongoing.)

Finally, even source code and an "open" license don't guarantee that an Android phone will be open in other ways. Because Android is available under the Apache license, device makers are free to modify it as they see fit, with no requirement to relicense their changes or to provide source code. Some have performed the device equivalent of total conversions: Barnes and Noble's Nook Color e-book reader is an Android tablet, though casual users need never know it. Other device makers are more tactical: they reskin Android, preload "junkware", and lock down features like WiFi support. These moves aren't surprising: the device makers want to build their own platforms rather than being commodity parts of Google's empire, while the carriers don't like features that eat into their business models. Unsurprisingly, the jailbreakers are on the case.

There are horizontal disputes at the operating system level, too. Apple is currently suing Samsung on multiple fronts, claiming that the Galaxy line of phones and tablets "slavishly" copied from the iPhone. There are patent claims and counter-claims in there, but also some extensive trademark claims relating to the phones' interfaces. Check out the side-by-side comparisons; would you as a cell phone buyer be confused as to who made the Galaxy and whether it's an iPhone?

Controlling the apps

App stores were pretty anemic until Apple came along. Carriers had small stores with apps (read: "lame-o games") and content (read: "lame-o ringtones") that were often maddeningly phone-specific because of the highly fragmented market. This happened at a time when the stack bottleneck was at the carrier level. RIM offered downloads for the BlackBerry, but Asteroids and Dope Wars clones weren't much to write home about. Although the iPhone launched without an app store, and Steve Jobs was roundly mocked for saying that app developers should just write Web apps, when the iPhone App Store finally launched, it was a doozy. Now, app stores are *de rigueur* for serious stacks. The Android Market may lag behind Apple's offerings, but it's still a serious app store with significant depth. Even the Cydia directory of apps for jailbroken iPhones is an app store in all but name. HP's ignominious retreat from the phone and tablet markets can arguably be laid at the feet of HP's inability to build critical mass for its App Catalog.

The value of app stores is reflected in Apple's crusade to claim trademark rights over the phrase APP STORE. This is a horizontal dispute: Apple wants to make other companies' app stores marginally less attractive by insisting that they have slightly less catchy names than Apple's own store. But the argument is both silly and legally weak. An app store is a store. That sells apps. That's true whether it sells iPhone apps or Android apps or webOS apps. Microsoft opposed Apple's attempt to register APP STORE as a trademark, and last month, Amazon won the right in federal court to continue using the phrase in the name of its Amazon Appstore for Android.(Apple has had more success in Germany.)

Vertically, operating system creators have a lot to say about which apps they'll allow and which they won't. Apple, of course, is known for its stringent review process, including some 119 rules—which were made public only after long and sustained criticism. Apple says that its policies are aimed at improving the quality of the iPhone and the App Store for its users. But they're also aimed at improving the iPhone platform for Apple. While some users may not mind interface monstrosities, fart noises, or a WikiLeaks app, Apple sees them as bad for its brand. More dramatically, Flash isn't just a badly coded CPU hog, it also threatens to slip another layer into the stack and weaken Apple's control, so it's no surprise that the iPhone is a no-Flash-allowed zone. And let's not even get into the contortions Apple has gone through to keep developers from doing end-runs around Apple's 30 percent cut on all in-app purchases.

The Android Market is more notoriously a free-for-all, with looser enforcement (and more spam and copycat apps). But it's not completely unmanaged: Google pulled gaming emulators from the Market, even though the trademark and copyright cases against them are far from clear-cut. And when malware strikes Android users, Google strikes back and removes it from the Market—and even sometimes uses a remote kill switch to automatically remove it from infected phones.

The really interesting app store approval controversies involve apps that the carriers don't like. These are long-distance plays that span the entire stack: network operators use their relationships with device makers to insist on operating system restrictions on apps! The carriers want to charge for "tethering" your phone so your computer can use a phone's cellular connection, so they try to prohibit tethering apps that would let you do this for free. Apple plays along and doesn't allow tethering apps at all in the iOS App Store; in the Android Market, tethering apps are unavailable for some carriers. AT&T and Verizon have announced that they will start revoking unlimited data plans for users who get

around this restriction by jailbreaking. The advocacy group Free Press filed a complaint with the FCC against Verizon, claiming that the restrictions violated the 700MHz block open access conditions.

Apple also allegedly blocked Google Voice in 2009, leading to speculation that AT&T was pulling the strings. An FCC investigation followed, during which Apple claimed that Google Voice would "alter the iPhone's distinctive user experience." But then a year later Apple approved Google Voice, so who knows?

Horizontally, trademark and copyright issues are also endemic within the smartphone app stores. Sometimes the ripoffs are utterly shameless. The line can be blurry: it might be okay to make a Breakout clone but not to call it "Breakout." Can one have an exclusive right to sell apps that make it look like you're drinking a beer out of your phone? One developer thought so, and now claims rights over chocolate milk as well. And who could forget that classic of jurisprudence: Pull My Finger v. iFart Mobile?

The fact that these apps are being sold through app stores changes the legal picture a bit. Instead of bringing a lawsuit, the first step may be to complain to the app store owner and ask them remove the app. But this is a sword that cuts both ways; is your app too similar to Tetris in Apple's sole and unappealable discretion? Buh-bye. Is your independent game named "EDGE"? Then look out for trademark trolls. (This particular troll eventually overreached.) Apple's quick trigger finger in response to claims of infringement can be a developer's nightmare. And perhaps the fox is guarding the henhouse; sometimes features from third-party apps find their way into iOS itself.

War of the stacks

Finally, we have the strategic assaults on the stack itself, with the goal either of shutting it down or extracting every last cent possible. There are now so many smartphone patent suits that just keeping track of them is a difficult exercise. Things have gotten so intense that individual lawsuits may be nothing more than skirmishes in larger back-and-forth wars, like the way that Samsung and Apple are each suing each other in a sprawling international dispute. Despite the drama, these brouhahas often end with cash payments and licensing deals, like the recent Nokia-Apple settlement.

Of course, patent litigation, patent licensing, and patent trolling are nothing new. Where things get truly interesting is when a patent covers something so central to a stack that it the patent owner can threaten to shut the whole thing down. The real trend-setter here was NTP's lawsuit against RIM. NTP's patents covered core aspects of BlackBerry's push e-mail system, a feature RIM couldn't have deactivated without turning BlackBerries into near-bricks. Once RIM's challenge to the validity of NTP's patents failed, RIM had almost no choice but to settle in 2006 on NTP's terms, for a stunning $612.5 million. Tactically, NTP's lawsuit was simple: RIM was the obvious target, since it had the deep pockets and more or less *was* the complete BlackBerry stack.

More recent patent campaigns, though, have shown that it's possible to target other players as well. Lodsys, for example, which claims to have patents on in-app purchasing, has been strategically targeting iPhone and Android app developers. Lodsys isn't the first patent owner to go after app developers, but it's taken the shakedown strategy to a new level. Being smaller, app developers are more vulnerable than the big players; even Rovio pales in comparison with an Apple or a Motorola. Lodsys is hoping that the developers will just pay its .575 percent royalty rather than spend the immense sums required to litigate a patent lawsuit.

The responses to Lodsys show, however, that Apple and its developers understand that their fates are linked: they're parts of the same stack. Developers are banding together, and Apple has stepped forward, arguing in court that its license for Lodsys's patents also protects iPhone app developers. (Unsurprisingly, Lodsys disagrees.) What Apple can do may be limited: software patent analyst Florian Mueller thinks that Apple's and Google's license agreements may obligate them not to challenge the validity of the patents themselves.

This is also the pattern with the mounting patent thunderstorms around Android. Google is a defendant, to be sure, but so are its partners. Apple's lawsuit against HTC has been called a "proxy fight" against Android. One of Apple's moves shows how shifting up or down a level in the stack can add leverage. It has been filing complaints against HTC with the International Trade Commission, which can issue exclusion orders keeping infringing products from being imported into the US. Impounding their phones is a very good way to get a device maker's attention.

Microsoft's litigation against Motorola over its Android phones is similar: this is as much about Android as it is about Motorola's specific phones. Well, okay, maybe it's also a little bit about Microsoft still being peeved about Motorola's defection from Windows Mobile to Android. But Microsoft's suit against Barnes and Noble over the Nook and Nook Color—well, that's just about Android. Google's purchase of Motorola may simply take the middleman out of the picture and leave the two titans to pummel each other.

Then there's Oracle's suit against Google, which blends copyright, trademark, and patent. Java is in theory an open standard, with the JAVA trademark reserved for implementations that conform to the specification. Android runs a Google-created virtual machine named Dalvik that is highly Java VM-like but optimized for low-memory devices (e.g., it is register-based rather than stack-based). Because Dalvik's bytecodes differ from the official Java VM bytecodes, Google is careful not to call it a "Java" virtual machine. Nonetheless, Dalvik runs code written in Java

and comes with Java libraries developed by Apache's Harmony project. Oracle claims that Dalvik isn't truly clean-room—that Google copied some of Oracle's actual code. Moreover, because Dalvik is not an implementation of the Java VM spec, Oracle claims it falls outside the patent license that automatically protects spec-compliant implementations.

Apple, Microsoft, Oracle—Little wonder that Google feels a little ganged up on. In a recent blog post, Google's Chief Legal Officer, David Drummond, argued that the company's rivals were engaged in "a hostile, organized campaign against Android" using "bogus patents." He also pointed out that consortia with members including Microsoft and Apple have been buying up pools of patents from Novell and Nortel, a move that Drummond called "anti-competitive." Then Microsoft General Counsel Brad Smith shot back with a tweet that Google itself had turned down the chance to be part of the Novell patent consortium. Drummond's response was that being part of the Microsoft team would have "eliminated any protection these patents could offer to Android against attacks from Microsoft."

Neither side comes out particularly well from this exchange. On the one hand, Google has a point about the low quality of software patents. And even if the patents are valid, the cynicism of buying up patents to put the squeeze on a rival is pretty ugly. A hypothetical Apple-Google lawsuit, say, would be a lawsuit against a company that didn't invent the technology at stake ... by a company that didn't invent it, either. On the other hand, Google had the chance to make offers and decided it wasn't worth the cash (even though the company has almost $40 billion burning a hole in its pocket). And when Drummond talked about "protection," he wasn't talking about the patents giving Google a defense from the guys with the baseball bats who bust your kneecaps if you don't pay up. No, he meant that Google wanted a baseball bat of its own so it could start busting kneecaps in revenge. Motorola's 17,000+ mobile-related patents are a $12 billion bat.

Conclusion

It's hard to work through this list without getting first exhausted, then jaded, then angry. (Your own emotional order may vary.) The law helps protect real innovators, from the smallest one-person app developer to the huge teams that create new devices and new operating systems. But the sheer, baroque profusion of lawsuits and threats signals a system out of balance. The future of the smartphone market is cloudier than it ought to be—and the increasing dominance of intellectual property lawyers is in large part to blame.

James Grimmelmann is an Associate Professor at New York Law School.