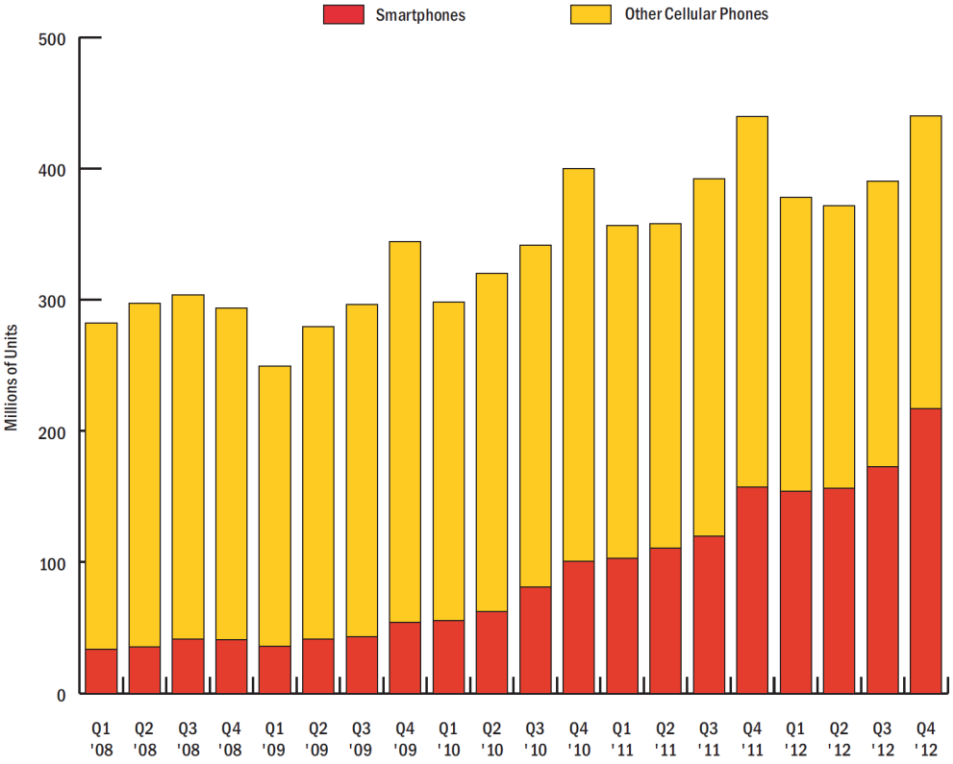
Theories of harm with SEP licensing do not stack up

I have already written several articles for IP Finance citing many references with facts and figures which show how exceedingly well the cellular industry and its customers have done in recent years. The outstanding innovation, product and service adoption is based on various and numerous interdependent technologies; and these are also subject to thousands of patents with extensive licensing among technology developers and manufacturers.

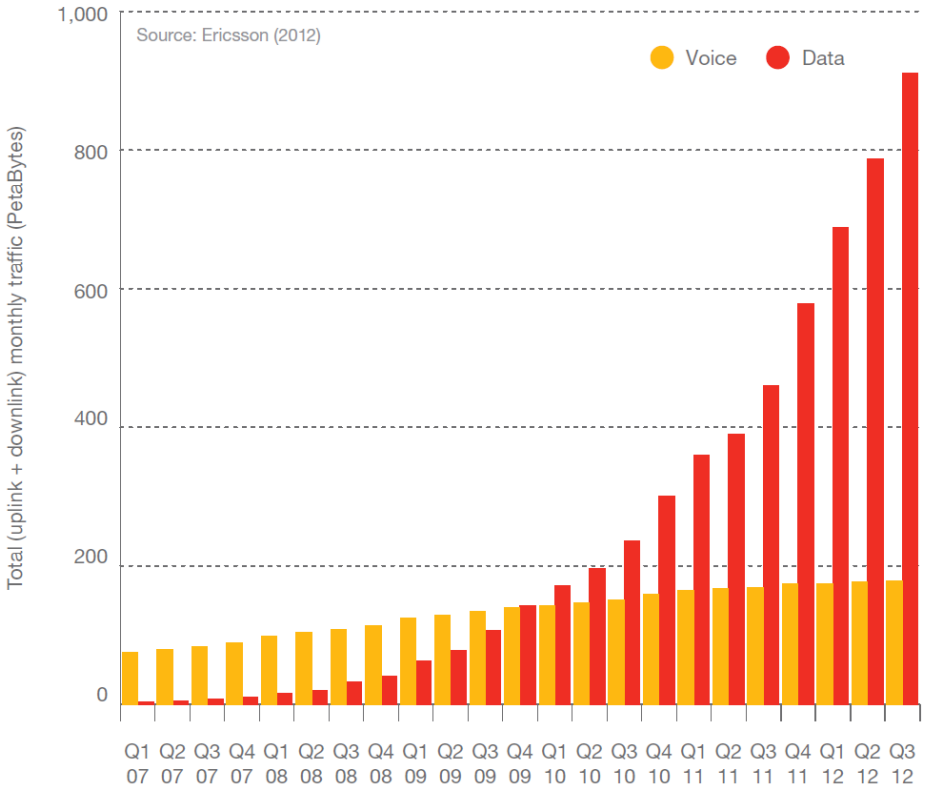
Along with further supporting evidence of this success, including updated market information and analysis, this article also shows that detractors' dire predictions over the last six years or more on patent royalty effects are incorrect, unfounded and based on inapplicable theories. There is no evidence that aggregate patent royalties paid have had any detrimental impact on this highly competitive and flourishing ecosystem. To the contrary, by every measure the patent system and the risk-reward balance it strikes—to spur innovation while not overburdening licensees—is undoubtedly working; without the need for implicit or explicit caps on aggregate royalties and with no more than a trivial amount of patent pooling for cellular patents. The revolution in cellular since around 2007, with high growth in smartphones and data services including mobile broadband, as illustrated in Exhibit 1 and Exhibit 2 respectively, is widely beneficial. Smartphones are cellular with high-level operating systems including Apple's iOS, Google's Android, Microsoft's Windows Phone and BlackBerry. Trends in technology development, breadth of competition, prices and consumer choice are all positive. Instead of causing harm, intensive standard-essential patenting with (Fair) Reasonable and Non-Discriminatory Licensing, including extensive cross licensing, has encouraged innovation and participation in standards development while efficiently and fairly redistributing some of the costs and financial returns from major investments across the broad ecosystem.

Exhibit 1: Massive global adoption of smartphones in recent years has driven....



Sources: Industry analysts including Gartner, Strategy Analytics and WiseHarbor using company disclosures

Exhibit 2: Exponential global growth in cellular data with mobile broadband



Source: Ericsson Mobility Report, November 2012

Extensive patent licensing, and in only a very small proportion of instances litigation—including out-of-court settlements and exceptionally FRAND rate determinations or injunctions by the courts—illustrates that things are working rather well—not broken. There is abundant publicly-available evidence of widespread patent licensing in cellular technologies. In addition, many other such agreements are not disclosed. Where and when there are disputes, litigation costs are small in the context of the $2 trillion or so per annum in cellular products and services. Tensions and spats are inevitable as players jostle to reposition themselves in a sector that has been literally turned upside down over the last six years. For example, Nokia has plunged from 50% global market share leader down to 5% in smartphone units sold, while Apple's share has risen from 0% to 22% (and rather higher in terms of value share).

Much ado about nothing

Disaffection with the prevailing system for licensing and litigating standard-essential patents is nothing new. A 2006 paper entitled Patent Holdup and Royalty Stacking by Mark A. Lemley and Carl Shapiro alleged "interacting areas in which problems arise: *injunction threats* and *royalty stacking*." The authors noted they were "especially interested in how these problems affect the royalties that will be negotiated between patent holders and downstream firms that produce products that may infringe those patents." Their stated concern was that "[a]fter all, since far more patents are licensed or settled than litigated to judgment, the primary economic effect of rules governing patent litigation arises through the effect of those rules on the licensing terms that are negotiated in the shadow of litigation." Their beef was that resulting royalty rates exceed their "inherent value", and that "royalty stacking causes harm based on reduced output, higher prices, and thus deadweight loss." (Emphasis added).

The analysis, however, was largely theoretical: with limited, inaccurate and unreliable quantification of royalties paid; no indication of whether or not these rates—stacked, cross-licensed or otherwise—represent value for money; and no reasoned assessment of whether or not elevated prices or harm have ensued for implementers or end-users. Case studies on "3G Cellular Technology" and WiFi were singled-out as "Empirical Evidence of Royalty Stacking". However, in the case of 3G, the only royalty figures presented were an unreferenced estimate of 30% before cross-licensing and "Thelander suggest[ing] that actual royalties may run to 22.5% for the WCDMA technology, in addition to 15-20% for GSM technology if the phone is dual band." Unmentioned by the authors, the cited June 2005 report entitled The IPR Shell Game, lists numerous standard-essential patent holders and states that "those companies that have essential patents are not subject to these rates due to cross-licensing arrangements." That exclusion applied to around 90% of handset manufactures on the basis of the report's GSM patent ownership analysis and concurrent detailed market share tracking from industry analyst firms including Gartner and Strategy Analytics (their press releases do not provide all the market share details analysed). In the case of WiFi, one jury verdict for a single patent is cited as evidence of the royalty stacking problem.

Undeterred by the paucity of evidence for the alleged costly stacking or actual harm, six years on the authors present their remedies to the aforementioned "problems" in a sequel paper entitled

A Simple Approach to Setting Reasonable Royalties for Standard-Essential Patents. As in 2006, Lemley and Shapiro rely on the same inapplicable theory in their 2013 paper to assert overcharging and resulting competitive harm, while neglecting to consider marketplace evidence. In their recent paper, binding arbitration is advocated to set portfolio royalty rates and thus eliminate the alleged overcharges that result from licensing with the status quo. I will defer my analysis and opinions on the proposed fix, to others or until a later date, with my focus here on debunking the alleged problems.

Misplaced compliments to Cournot

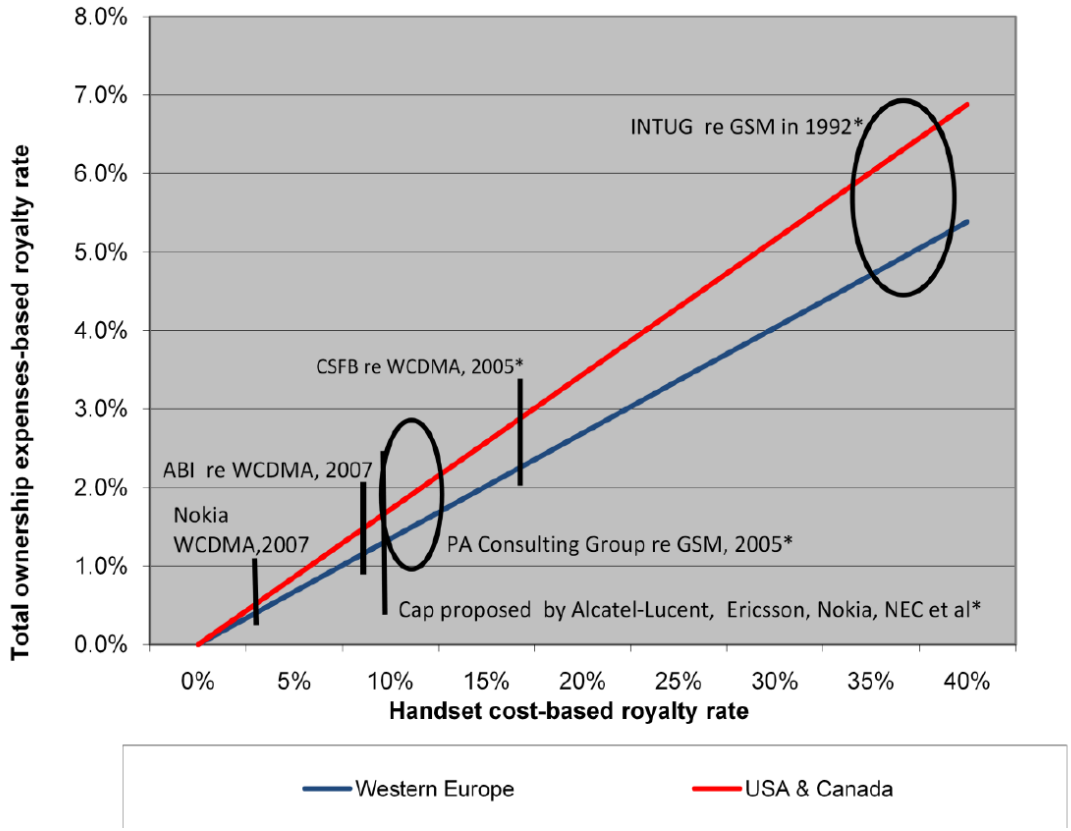
Lemley and Shapiro rely on 19th Century economic theory—developed long before the existence of ICT, SEPs and (F)RAND licensing. According to these authors, the supposed Cournot-complements problems occur when multiple "input" owners each charge more than marginal cost for their input, thereby raising the price of the downstream product and reducing sales of that product. Cournot used the example of two separate monopolist copper and zinc suppliers selling to manufacturers of brass. Each input supplier imposes a negative "externality" on other suppliers when it raises its price, because this reduces the number of units of the downstream product that are sold. As a result, if multiple input owners each control an essential input and separately set their input prices, output is depressed even below the level that would be set by a vertically-integrated monopolist. Also according to Lemley and Shapiro, the theory of Cournot complements concludes that royalty stacking will be worse the greater the number of independent owners of patents that read on a product.

The negative effects Cournot predicts are demonstrably not occurring with SEPs in cellular despite the numerous complementary patented "inputs" to the licensed standards. The Cournot complements problem is supposed to raise downstream product prices, while squeezing manufacturer margins, impeding manufacturer market entry and forcing market exits. Instead, evidence shows the opposite effects in ICT including standards-based technologies. Increasing numbers of patented complements—in the thousands in many cases—refutes applicability of Cournot's theory here. And this is in spite of fragmentation of ownership and uncertainties about rights in many cases. There are 125,000 patents which have been declared by hundreds of companies, on an ETSI database with public access, as possibly essential to 3GPP's cellular standards. This reflects substantial growth in patenting and declarations since 2006.

Upstream royalty costs

In a June 2011 article for IP Finance, I showed that aggregate royalty rates had reduced to much lower levels than the above figures, and that as a proportion of the entire cost of cellular phone ownership, including service fees, were in the low single digits, as reproduced in Exhibit 3.

Exhibit 3: Aggregate royalty rates based on total ownership expenses



Sources: WiseHarbor analysis on figures from sources cited above

In that article, my analysis on aggregate royalty rates was as follows:

> *Estimates for "cumulative royalties" vary widely. In 1998, International Telecommunications Standards User Group (representing some operators and manufacturers) complained to the European Commission that "when GSM handsets first appeared on the marketplace cumulative royalties amounted to as much as 35 percent to 40 percent of the ex-works selling price". Much lower estimates for the cumulative GSM royalty rate paid, by companies that do not have any patents to trade, include 10-13 percent (IP Law and Business reporting PA Consulting Group **estimate**, July, 2005). In September 2005, CSFB's "3G Economics" report estimated cumulative royalties had fallen to single digits and predicted 17.3% cumulative royalties in WCDMA "for those vendors without an IPR position to trade off". Whereas ABI Research **described** average WCDMA cumulative royalties of 9.4% in 2007 "a most challenging barrier... ...to the development of more affordable devices", the market-leading handset manufacturer with 37% share was paying much less: Nokia **stated** that "until 2007 it has paid less than 3 percent aggregate license fees on WCDMA handset sales under all its patent license agreements".*
>
> *In addition, there have been various attempts to determine aggregate fees sought by licensors for new technologies. In 2007, the Next Generation Mobile Network (**NGMN**) Alliance, an industry group led by mobile operators and including major 4G equipment*

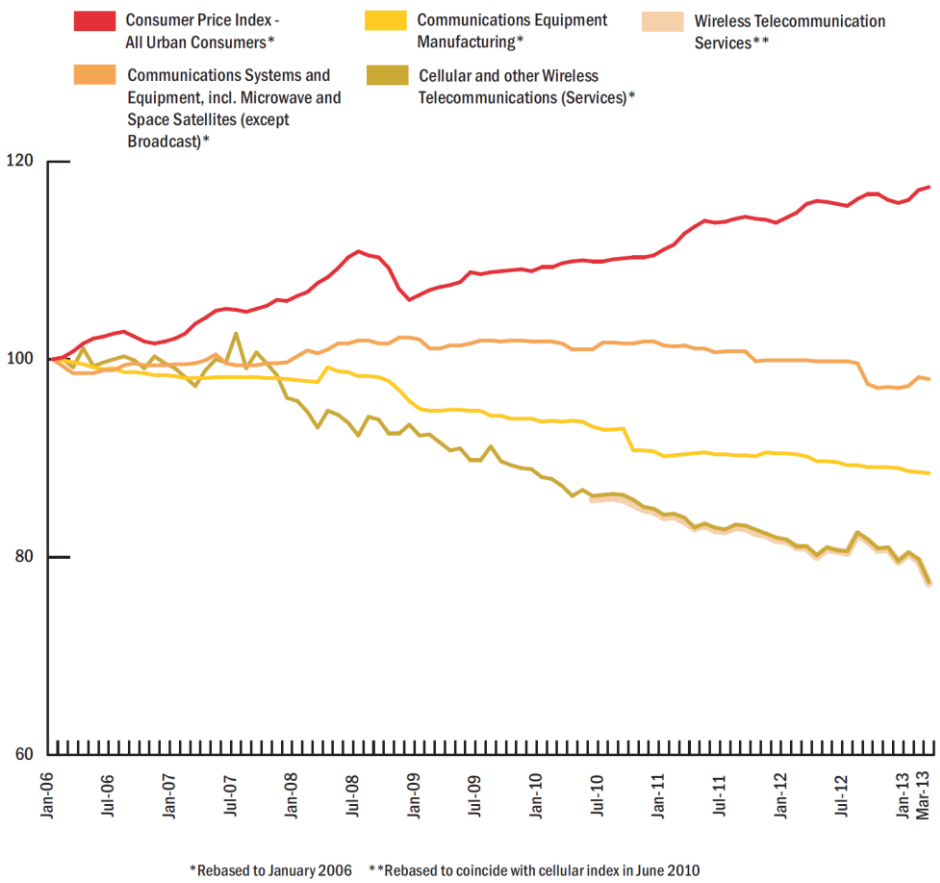
> *vendors, established a confidential process for the ex ante disclosure and aggregation of expected licensing fees for a number of upcoming 4G standards including LTE. The process concluded in 2009 and the results are confidential. However, commentators have suggested the individual disclosures of expected licensing fees—which were in several cases accompanied by public disclosures on company websites—produced misleading and unrealistic figures.*
>
> *Aggregate figures derived are not actual prices paid including cross-licensing and do not reflect other realities in negotiations such as identification of patents that are weak or inapplicable. Patent strengths and "essentiality" were not validated. In 2003, the 3G Patent Platform Partnership (including 19 telecommunications operators and equipment makers)* ***estimated*** *"that several hundred different patents, among several thousand publicly claimed as essential, will actually be determined to be 'essential patents' in implementing 3G standards". Some candidate licensees would rather risk being sued than pay "rack rates" in these circumstances. Licensors prefer to negotiate settlements than litigate and subject their patents to invalidity and non-infringement claims. Vertically-integrated licensors are particularly concerned about their product revenues with the risk of being counter-sued for infringement.*

There is no evidence that aggregate royalty payments have increased, despite ongoing technological developments with additional standardisation, new market entry, product introductions and successes including Apple with the iPhone since 2007, Android smartphones since 2008 and LTE since 2010. For example, many patent portfolio licensing agreements demand no additional royalties despite the inclusion of additional SEPs as existing standards are further developed or new standards are introduced.

Downstream product and service prices

Whereas Lemley and Shapiro provide no empirical analysis on downstream pass-through for the alleged stacked and rising aggregate patent costs, evidence shows prices for cellular products and services have generally declined since 2006. For example, comparison of various indices from the U.S. Bureau of Labor statistics in Exhibit 4 shows that quality-adjusted prices for applicable product categories have fallen or remained flat in comparison to the rising Consumer Price Index. Exhibit 5 provides more detail on the indices used. These include some non-cellular along with cellular products and services. However, cellular spending has led or dominated telecommunications products and services in recent years.

Exhibit 4: Cellular prices flat or falling versus the rising CPI



Source: U.S. BLS indices

Exhibit 5: U.S. BLS indices including CPI and those including cellular products and services

Type	Category	Name	BLS Series ID
Consumer Price Index	Consumer Price Index	Consumer Price Index - All Urban Consumers	CUUR0000SA0
Producer Price Index Industry Data	Broadcast and wireless communications equipment mfg	Communications systems and equipment, incl. microwave and space satellites (except broadcast)	PCU3342203342201
Import/Export Price Indexes	NAICS import Indexes	Communications equipment manufacturing	EIUIZ3342
Producer Price Index Industry Data	Wireless telecommunications carriers	Cellular and other wireless telecommunications (services)	PCU51721051721012
Producer Price Index-Commodities	Telecommunication, cable, and internet user services	Wireless telecommunication services	WPU372

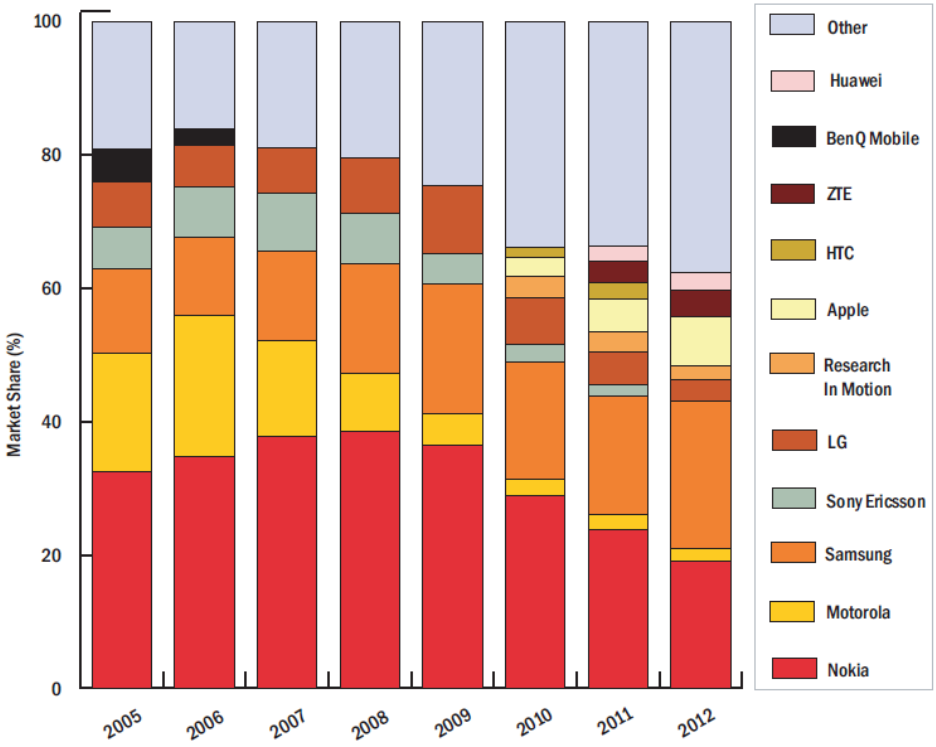
Pricing trends must be analysed with more sophistication than comparing average prices. It is important to compensate for changing quality—including increased functionality and performance—because some averages in cellular phone pricing have increased as the product mix has changed to include increasing proportions of smartphones. Unlike lower-end phones, smartphones have adopted relatively large multi-touch screens, increasingly powerful applications processors, high-level operating systems and mobile broadband among other capabilities in recent years.

Cellular phones are available at low and declining prices despite increasing functionality and performance with 3G communications and powerful software applications in many cases. Smartphone sales are being propelled in developing markets with unsubsidized handset prices as low as $100 for entry-level LTE Android handsets in 2013. Ultra-low cost mobile phones are sold without operator subsidies for as little as $25 or less.

Less-concentrated market shares and new market entry

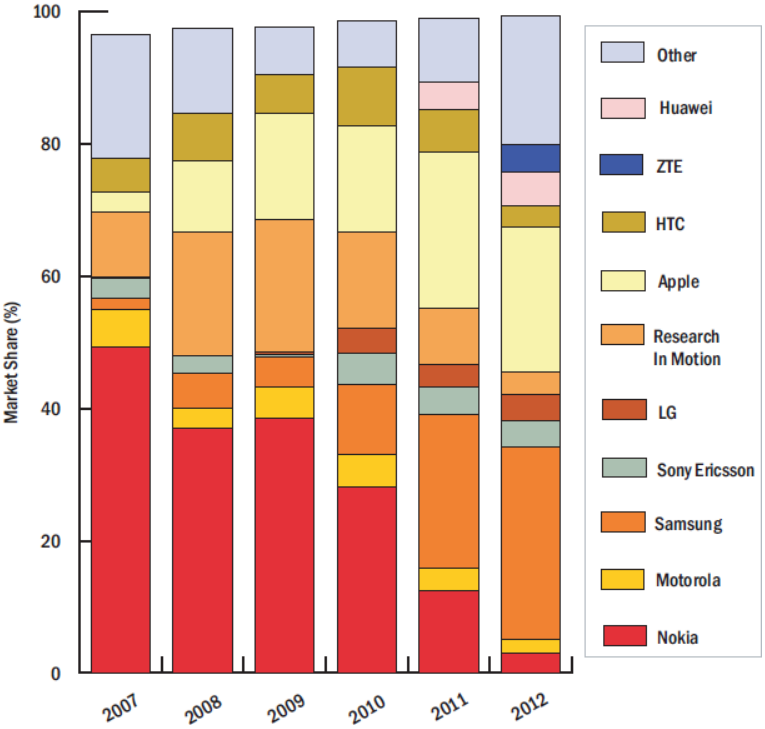
Manufacturer market shares have become less concentrated in cellular phones including smartphones with significant market entry and major shifts in market share. Exhibit 6 and Exhibit 7 show how dramatically incumbent market shares have changed with major share losses for Nokia, Motorola, Sony Ericsson (now Sony), RIM (now BlackBerry) and others. Apple entered the market in 2007 with no prior history in the sector and little or nothing in the way of cellular SEPs. It has subsequently risen to smartphone market leadership in the U.S. and second only to Samsung globally.

Exhibit 6: Cellular phone market shares



Sources: Industry analysts including Gartner, Strategy Analytics and WiseHarbor using company disclosures

Exhibit 7: Smartphone market shares

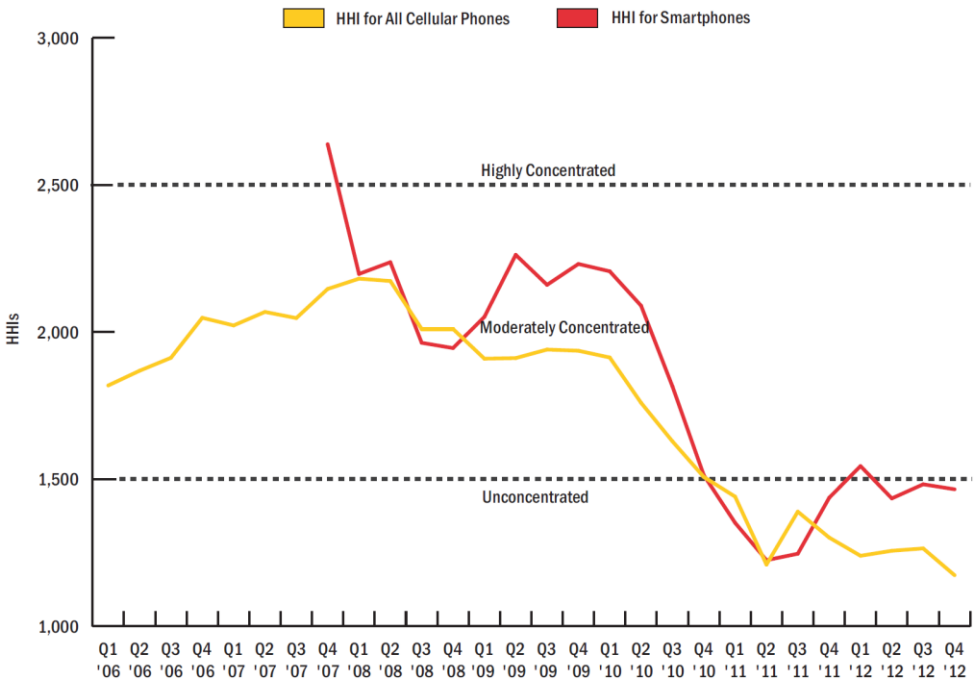


Sources: Industry analysts including Gartner, Strategy Analytics and WiseHarbor using company disclosures

Numerous Asian and other manufacturers have also entered the cellular phone markets in recent years including HTC, Huawei, ZTE, Lenovo, Coolpad, Ginoee, Micromax and Karbonn Mobiles (these are just some of the larger ones) with smartphones including 3G technologies. Huawei revealed it sold more than 20 million 3G handsets to China Telecom alone in 2010. Its 2011 average handset selling price was $125, despite the majority of sales being smartphones. China Telecom employs CDMA2000 EV-DO technology for 3G services. China added 113 million new 3G subscribers in 2012, in comparison to only 23 million new 2G subscribers. Handset market entry also includes manufacturers in western nations, such as UK-based MOJO Maker selling its own-designed phones across Europe.

The decreasing and relatively low market share concentration in downstream cellular handset manufacturing is also evident from and can be quantified by trends in the Herfindahl-Hirschman Index. This is the most widely-accepted measure of concentration in competition analysis. For example, it is used by various government agencies including the Department of Justice and the Federal Trade Commission in evaluating prospective mergers. The HHI is calculated by summing the squared market shares of all firms in any given market. Antitrust authorities in the United States generally classify markets into three types: Unconcentrated (HHI < 1500), Moderately Concentrated (1500 < HHI < 2500), and Highly Concentrated (HHI > 2500). Market concentration has reduced from moderately concentrated to unconcentrated for smartphones and for cellular phones in general since 2007, as shown in Exhibit 8.

Exhibit 8: HHI tracking declining manufacturer market share concentration



Sources: WiseHarbor analysis on figures from Gartner, Strategy Analytics and WiseHarbor using company disclosures

Apple was a new cellular market entrant in 2007 with little or nothing in the way of cellular SEPs, and yet it has achieved and maintained strong profit margins. This is due to its innovative handsets including its own-patented technologies, others' SEP technology, complementary offerings such as software applications through its App Store, bricks and mortar retail outlets and strong brand differentiation. Apple's smartphone gross profit margins have remained very high, in comparison to other manufactured ICT consumer products, at around 48%, as estimated by Jefferies & Co in an April 2, 2013 research note. This margin, as computed in Exhibit 9, substantially exceeds those for its other product lines including Mac, iPods and (predominantly non-cellular) iPads and is much higher than the industry average for smartphone manufacturers. Samsung had only a few percent smartphone share until 2008 with the launch of the Android handset operating system that year. It is also commanding strong profit margins with Samsung's overall financial health being significantly attributed to its market leadership in smartphone sales.

Exhibit 9: Strong iPhone profit margins for Apple

	CY2012
Units (millions)	135.8
Average selling price	$639
Revenues (millions)	$86,776
Gross Profit (millions)*	$41,653
Gross Margin	48.0%

Source: Jefferies, company data

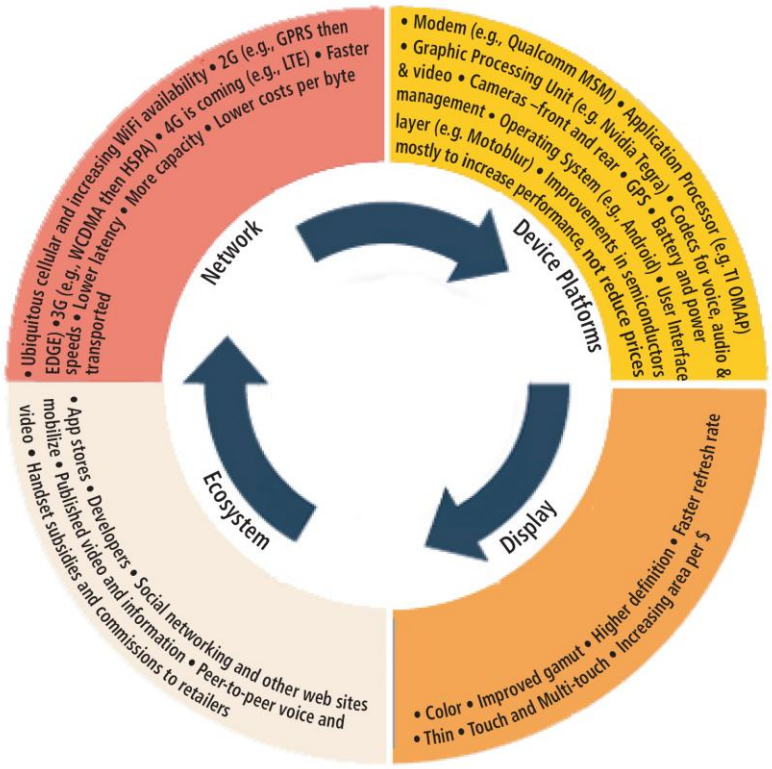
**[Jefferies] estimates as Apple does not report GM by product line*

Virtuous circle in cellular developments

There are many other indicators of cellular's success that also defy the alleged harms caused by the need to license multiple patent rights to commercialize new technologies. Shapiro, Hargreaves and others have also argued that "patent thickets" will "hold-up" market development, impede entry and stifle innovation; but there is overwhelming evidence to the contrary in my previous IP Finance postings entitled *SMEs, SSOs and Patent Thickets* and *There aren't too many Patents*.

The following update also shows how cellular communications has progressed in leaps and bounds with smartphones and mobile broadband in particular over the last six years. Exhibit 10 illustrates that cellular has developed with a virtuous circle of various significant and complementary factors. The cellular and other standards-based technologies, including 802.11 (WiFi), H.264 (video codec), Bluetooth and GPS, as standardized by 3GPP and other standard-setting organisations, and as incorporated in the networks and devices are most significant. The vast majority of the world's cellular operators adhering to 3GPP standards could provide data speeds of no more than the few hundred kilobits per second maximum provided by WCDMA, or considerably less with 2G GPRS or EDGE technologies, until the introduction of multi-megabit per second 3G HSDPA. This technology was first launched by AT&T in December 2005, with national network rollout in 2006. This was mostly used by a market niche of PC data card users until the revolution in smartphones, the introduction of the 3G iPhone and Android devices in 2008 and with surging smartphone sales with significant market impact thereafter.

Exhibit 10: Virtuous circle in cellular developments



Source: WiseHarbor

Cellular has advanced in a succession of large and small upgrades and the pace of change has accelerated. Significantly, this has provided the much faster connection speeds and low latency (time delay for data packets to transit the network) required for the satisfying end-user experiences that are provided in today's smartphones that were not possible in 2006.

The cellular networks have also increased capacity to support active mobile data users, who have grown from a small minority to a mass market majority in the last six years. Enhancements have included HSPA+ and the introduction of 4G LTE services, with 163 commercial networks in 67 countries and more than 69 million subscribers, according to a 2013 publication by the GSA. The time-to-market from standardization to implementation in networks and devices was quicker with LTE than with previous technology generations. It took less than two years from 3GPP Release 8 standardization to the first major commercial launch by frontrunner Verizon in 2010. Innovation is continuing apace to 2020 and beyond.

By comparing the features and performance specifications of market leading smartphones in 2006 with those in 2012/2013, Exhibit 11 and Exhibit 12 show how very dramatic advancements have been. For example, device data speeds have increased 100-fold or more. Apple and former U.S. smartphone market leader BlackBerry have only offered 3GPP-compliant 3G devices, as required on the vast majority of 3G cellular networks worldwide, since 2008 and 2009 respectively. The smartphone revolution has started in earnest since then.

Exhibit 11: Smartphone market leaders' model specifications in 2006

Introduced	**April 2006**	**June 2006**
Images not to scale		
Model	Nokia N93	BlackBerry 7130c
2G Network	GSM 900/1800/1900	GSM 850/900/1800/1900
3G Network	UMTS (WCDMA) 2100	No
Data Speed	384 kbps (3G)	<300kbps (2G)
Chipset		
Central processor	332 MHz Dual ARM 11	312 MHz Intel XScale
Graphics processor	3D Graphics hardware accelerator	No
Operating System	Symbian OS 9.1, Series 60 3rd edition UI	BlackBerry OS
Display	TFT, 256K colours, 240 x 320 pixels, 2.4 inches, 36 x 48mm, 167 pixels per inch	65K colours, 240x 260 pixels, 2.4 inches, 147 pixels per inch
Touchscreen	No	No
Memory	50MB storage +64 MB RAM +128 MB miniSD Card	64 MB storage +16 MB RAM
Cameras	3.15 megapixels, VGA @30 fps: secondary CIF videocall camera	No
Leading Features	SMS, MMS, WAP/xHTML, HTML, Email, IM, polyphonic ringtones, MP3/MP4 and video calling	SMS, MMS, HTML, Email, IM, polyphonic ringtones
Full specification	http://www.gsmarena.com/nokia_n90-1155.php	http://www.gsmarena.com/blackberry_7130c-1623.php

UI= user interface, TFT= thin film transistor, WAP= wireless Application Protocol, MMS= multimedia messaging

Exhibit 12: Smartphone market leaders' model specifications in 2012 and 2013

Introduced	September 2012	June/September* 2012
Images not to scale		
Model	Apple iPhone 5	Samsung Galaxy S III: I747 and I9500*
2G Network	GSM and CDMA (multiple bands)	GSM 850/900/1800/1900
3G Network	HSDPA and EV-DO (multiple bands)	HSDPA 850/900/2100
4G Network	LTE (multiple bands)	LTE 700/2100 or LTE 800/1800/2600*
Data Speed	100 Mbps (LTE)	50 Mbps (LTE)
Chipset	Apple A6	Qualcomm MSM 8960 or Exynos 4412 Quad*
Central processor	Dual core 1.6 GHz	Dual core 1.5 GHz or Quad core 1.4 GHz Cortex-A9*
Graphics processor	PowerVR SGX 543MP3 triple core	Adreno 225 or Mali-400MP*
Operating System	iOS 6, upgradeable to iOS 6.1.3	Android OS v4.0 (Ice Cream Sandwich) or Android OS v4.1.1 (Jelly Bean)*
Display	LED backlit IPS LCD, 16M colours, 640x 1,136 pixels, 4 inches, 326 pixels per inch	Super AMOLED, 16M colours, 720 x 1,280 pixels, 4.8 inches, 306 pixels per inch
Touchscreen	Capacitive multitouch	Capacitive multitouch
Memory	16/32/64GB storage, 1 GB RAM	16GB storage, 2GB RAM, up to 64 GB microSD
Camera	8MP, autofocus, LED flash: secondary 1.2MP, 720p @30 fps	8MP, autofocus, LED flash: secondary 1.9MP, 720p @30 fps
Leading Features	Simultaneous HD video and image recording, touch focus, geo-tagging, face detection, 1080p @30 fps video, image stabilization. GPS with A-GPS support and GLONASS, accelerometer, gyro, proximity, compass	Simultaneous HD video and image recording, touch focus, geo-tagging, face and smile detection, 1080p @30 fps video, image stabilization. GPS with A-GPS support and GLONASS, accelerometer, gyro, proximity, compass, barometer
Full specification	http://www.gsmarena.com/apple_iphone_5-4910.php	http://www.gsmarena.com/samsung_galaxy_s_iii_i747-4803.php and http://www.gsmarena.com/samsung_i9305_galaxy_s_iii-5001.php*

IPS=In-Plane Switching, fps= frames per second, GPS=Global Positioning System

** September introduction for I9500 version. Superseded by the Galaxy S IV as flagship model in March 2013*

These improvements in cellular technologies and non-voice capabilities, together with plunging mobile broadband data communications prices, have increased consumer utility and stoked demand enormously. According to the U.S. Federal Communications Commission's *16th Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Services*, published March 2013, the effective price per megabyte of data declined from $0.47 per megabyte in the third quarter of 2008 to about $0.05 per megabyte in the fourth quarter of 2010, which is roughly an 89 percent decrease. As indicated in Exhibit 2, data has grown at an exponential rate to exceed voice on mobile networks since 2010. Also on the basis of Ericsson's figures (updated in February 2013), data was exceeding voice by a factor of seven by yearend 2012. Since around 2009, non-voice usage has also dominated time spent using phones and is now several times greater. On the phone for around 25 minutes per day, U.S. subscribers are the heaviest cellular voice users in the world. However, according to eMarketer, their non-voice minutes of use per day almost quadrupled from 22 in 2009, 34 in 2010 and 54 in 2011 to 82 in 2012.

This is no mean feat: in contrast to the very high data growth on fixed networks which could readily be accommodated with existing or new fibre deployments; the severe shortage of radio spectrum, high costs and planning constraints in adding cell sites (including masts, towers and rooftops), which are needed to increase spectrum reuse, mean that technological innovations to massively increase radio network capacity, as well as end-user speeds, are particularly important. These ongoing technological developments include the introduction of MIMO with HSPA, OFDMA modulation with LTE, carrier aggregation, interference cancellation, self-organising networks and many other techniques.

Standards competition, choice and secondary markets

Vibrant competition among standards has also helped accelerate the pace of technological innovation and service deployment. Competition in 3G technologies and standards initially included WCDMA and CDMA2000 from rival standards groups 3GPP and 3GPP2 respectively. IEEE challenged these incumbents with 802.16 WiMAX which was soon claimed to be a 4G standard. This in turn resulted in acceleration of 4G technology developments elsewhere including LTE standardisation by 3GPP. For example, with less than 10% of Vodafone's revenues from 3G services in 2006, there was a call to arms with LTE for cellular operators against WiMAX by Vodafone's former CEO, Arun Sarin at the GSM Association's Mobile World Congress in February 2007. Later that year, Vodafone and its 45%-owned CDMA technology-based partner Verizon Wireless announced they would both pursue LTE as their common next generation technology. A keynote presentation by Verizon Wireless CTO, Dick Lynch, at the 2009 Barcelona show announced the LTE vendor line up and most ambitious launch dates.

Consumers also have enormous choice in handset suppliers and device models. For example, while virtually non-existent until a few HSDPA PC data cards appeared on the market for AT&T's December 2005 service launch; by August 2012 there were 3,847 HSPA and 444 HSPA+ device models available worldwide, according to the GSA. Similarly, by March 2013, 97 manufacturers had announced 821 different LTE-enabled user devices. Also according to Gfk market research sales tracking, there were thousands of different phone models available in 2012. Significantly, this includes many that have

been discontinued by manufacturers for years. Rather like with cars, there is a vibrant secondary market for cellular phones and smartphones in particular that extends their operational life well beyond the conventional 2-year service-contract cycle. For example, in May 2013, Mazuma Mobile.com and others will pay up to £270 ($415) in cash for used high-end devices such as the iPhone 5 64GB. These devices are refurbished and resold globally.

Inherently inapplicable

Another flaw in the Lemley and Shapiro theories and analysis is the assertion of how the value in standards-based technologies should be accrued among different parties through licensing. The authors' assertion of what is deemed to be fair and appropriate in licensing hangs on a rather tenuous term and an erroneous principle. Their implication that "inherent value" means value absent the inclusion of patented technologies in standards is flawed and contrary to the way markets function efficiently. According to Dictionary.com, "inherent" means "existing in someone or something as a permanent and inseparable element, quality, or attribute." But prices can, do and must change significantly in the real world for economic reasons such as sunk, fixed and variable costs, the utility of what is created, changing market demand, existence of substitutes and competition. Technology developers and their financial backers will only invest if expected returns compensate for costs and risks including the cost of capital and of unsuccessful projects. Some developments are commercially successful and others are not, but it is impossible to know in advance what the outcomes will be.

Lemley and Shapiro load their arguments with misapplied theory on auction value. According to these authors, "the key idea here is that a reasonable royalty should reflect what would happen as a result of well-informed *ex ante* technology competition. The incremental value of the patented technology over and above the next-best alternative serves as an upper bound to the reasonable royalties". This is also clearly nonsense. Two different patented technologies that are each potentially very beneficial and yet costly-to-develop might vie for selection against each other in a standard as alternatives to provide certain essential functionality. If the utility or value to the standard of each was very similar, the above incremental value limitation would shrink the royalty price to virtually nothing by forcing the contenders to disregard their sunk costs. Monopsony-style purchasers (seeking to determine prices multilaterally) might be able to get away with rigging such an auction on a one-off basis, but if the "winner" only gets an inadequate payoff it will have insufficient incentive to keep investing in future innovative candidate technologies for the standards. In the dynamic, real world, developers of technologies that compete to be included in standards must factor in all costs and risks (including that of not being selected for standards) versus returns if they are selected.

Fees in lump sums or running royalties are among several considerations for patent owners in licensing. These also include netting-off charges in cross licences, defensive value in case of litigation threats, and the ability to use the technology in downstream activities such as manufacturing, including first-mover advantages. Different companies put different store in each of these, which is why overwhelming emphasis on cash royalty rates is both misleading and distorting. For example, a downstream manufacturer with a large market share might not care much about receiving cash royalties if it can reduce its royalty out-payments by having its technologies included in standards.

That financial saving might be passed on to consumers in lower prices to improve the company's competitive position and market share, or it may be retained to boost profits. Only empirical analysis can reveal what actually occurs.

If technologists compete to have their technologies included in standards, value can and does legitimately accrue from it being included in the standard because a technology might have little or no market value if it is not adopted. And yet, candidate technologies that are not selected might nevertheless be very costly to develop. This is not to suggest that also-rans are compensated where there is only one winner, as is sometimes misconstrued. Instead, it is that winners may legitimately be compensated handsomely enough to cover their losses from the failures, as well as the costs from developing technologies, if and when the standard achieves commercial success. This matter was also the subject of my first article for IP Finance in May 2011:

> *Many technologies developed are never adopted. Even those technologies that are contributed to a standard and selected for inclusion, on the basis of merit, might never generate return on investment because of the standard failing or being overtaken by a competing standard. Further, minimizing the cost of licensed technologies may not result in a minimum cost solution. In addition to providing higher performance and improved features, incorporating patented IP into a standard may actually reduce the cost of implementing the standard. For example, patented IP might reduce the total cost of ownership to the end consumer of a product such as a mobile phone – including phone acquisition costs (with costs of design, development, bill of materials and assembly) and network service charges (reflecting costs of bandwidth acquisition, network equipment, operations, and maintenance).*
>
> *The impact of such cost reductions may far exceed any additional costs in licensing fees. Market forces are best at determining the value to be attributed to any input component in such a system, including technology licences. Regulators should be careful to avoid favouring particular business models or making decisions on which part of the value chain deserves to make the greater profit, especially where dynamic innovation is concerned.*
>
> *Commercial negotiations between companies are the most effective way to balance the interests of the parties and to establish an agreement that takes into account their particular incentives and business relationships. Arbitrary pricing limits or ex-ante terms cannot take such factors into account and fail to recognize the inherent difficulty in determining a "value" for a certain technology early in a standards process or in the case where no competing technology exists. If regulated pricing principles were enforced, it could make patent owners leery of licensing technologies until incorporated in a major standard or of participating in the standards process at all, resulting in inferior and ultimately more costly standards.*

Unhealthy regurgitations

That the authors' theoretical and false assertions are propagating by being repeated, quoted and cited absent supporting evidence and in the face of much of it to the contrary does not make them any less wrong. Regrettably, Judge James L. Robart of the United States District Court for the Western District of Washington published his [F]RAND rate-setting decision in the *Microsoft v. Motorola* contract case also adopting their position: "From an economic perspective, a [F]RAND commitment should be interpreted to limit a patent holder to a reasonable royalty on the economic value of its patented technology itself, apart from the value associated with incorporation of the patented technology into the standard." Judge Posner has also erred in his *Apple, Inc. v. Motorola, Inc.*, 869 F. Supp. 2d 901, 913 (N.D. Ill. 2012) decision. As regurgitated by the FTC in its Analysis of Proposed Consent Order to Aid Public Comment: In the Matter of Motorola Mobility LLC and Google Inc., File No. 121-0120: "After manufacturers implement a standard, they can become 'locked-in' to the standard and face substantial switching costs if they must abandon initial designs and substitute different technologies. This allows SEP holders to demand terms that reflect not only 'the value conferred by the patent itself,' but also 'the additional value—the hold-up value—conferred by the patent's being designated as standard-essential.'"

Market facts and figures fly in the face of the theories and assertions in Lemley and Shapiro's 2006 and 2013 papers on alleged hold-up and royalty stacking. It is troubling that major legal and government agency decisions in the so-called smartphone patent wars should be so tenuously based.

About this article, the author and WiseHarbor

This article was written by Keith Mallinson and initially published by IP Finance on 24th May 2013.

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