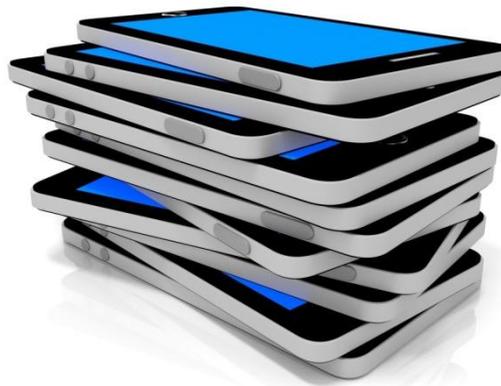


Stacking the Deck in Analysis of Smartphone Patent Licensing Costs

Estimates of patent licensing costs for smartphone manufacturers are greatly exaggerated. Allegations of excessive fees paid and resulting harm to manufacturer profits, incentives to invest and compete are faulty and unsupported by the facts – which show much to the contrary.

A [working paper](#) entitled *The Smartphone Royalty Stack: Surveying Royalty Demands for the Components Within Modern Smartphones* (the “Paper”) has been published by one in-house lawyer at Intel and two outside counsel from [WilmerHale](#). [Intel Vice President and Associate General Counsel Ann Armstrong](#) and WilmerHale’s [Joseph Mueller](#) and [Timothy Syrett](#) argue that aggregate patent licensing fees including SEPs and non-SEPs are excessive at around \$120 per \$400 smartphone. They conclude that “few suppliers are meeting the basic goal of selling devices for more than the costs incurred in supplying them,” imply that this is due to the alleged royalty stack, and state that “those costs may be undermining industry profitability—and, in turn, diminishing incentives to invest and compete.”

Allegations of excessive royalties and harm pile high in smartphones



The Paper’s economic and empirical analyses are deficient and defective. In contradiction to its findings, evidence shows that licensing fees:

1. Are not undermining profits and are not preventing manufacturers from covering more than their costs. [According to Credit Suisse](#), handset manufacturer operating profits since 2007 have tripled to \$51 billion on \$326 billion revenues in 2013.
2. Are not excessive. There is no basis for arbitrary price caps on smartphone patent fees, or limits based on chip manufacturing costs. The latter are unrelated to patented technologies and the value they generate more broadly in the entire device, its use in mobile networks, or across the broader ecosystem including services and applications. Methods of determining charges follow well established principles and benchmarks in bilateral negotiation. Patent licensing fees are analogous to licensing fees for book, music, movie or software publishers, which typically exceed greatly the cost of the physical mediums on which they are published and distributed.



3. Are nowhere near \$120 in aggregate; and there is copious evidence actual payments are much lower than purported. The Paper inexplicably and erroneously disregards fundamental offsets in cross-licensing which greatly reduce or eliminate fees paid to many patent owners. This figure is also systematically biased and inflated by including rates demanded by licensors, even where there is no evidence anybody—including those who have little or nothing to cross license—actually pays such rates. And, where there is, instead, copious evidence that rates actually paid, if at all, are substantially less—orders of magnitude less in some instances. For example, court-adjudicated rates were much lower than “demanded” rates in various cases, and yet the higher figures were used in calculating the above total.
4. Are helpful, not detrimental, to the [highly competitive and flourishing smartphone ecosystem](#). By every measure the patent system and the risk-reward balance it strikes—spurring innovation, market entry and competition while not overburdening licensees—is unmistakably working very well.

Theories and practice, in litigation and commercially

This reply to the Paper follows my previous IP Finance posting on alleged royalty stacking entitled [Theories of harm with SEP licensing do not stack up](#) in which I responded to papers co-authored by Mark A. Lemley and Carl Shapiro in 2006 and 2013, and my posting entitled [Absurd \(F\)RAND licensing-rate determinations for SEPs](#) that analyses some U.S. court judgments which have relied on these economists in their royalty rate determinations. I concluded that economic theories employed (such as that developed by Cournot in the 19th Century to explain pricing effects in the manufacture of brass) are inapplicable to 21st Century ICT patent licensing including smartphones. Theories applied by these economists were not supported by any empirical evidence related to mobile phones. In contrast, evidence I presented indicates the alleged stacking problem does not occur in practice.

The Paper includes pages of purported analysis on smartphone licensing costs, but much of this is defective or misleading: conclusions are largely drawn on the basis of biases and conjecture instead of facts and rigorous analysis. It provides an unbalanced and distorted perspective on litigation versus licensing in general. The Paper’s authors boast “years of experience studying such costs, as an in-house attorney at a supplier of components for mobile devices, and as litigators who have worked on many patent cases involving smartphones.” The Paper includes discussion of patent litigation, including by non-practicing entities, but without assessing how (in)significant this is in comparison to negotiated licensing without resorting to legal action in this major industry sector. This is a fundamental flaw. The authors make no mention of any experience in forging bilateral agreements without litigation—where terms and conditions for the vast majority of smartphone patent licenses are peacefully determined outside public view.

Economic and econometric analyses are also absent. The Paper does not assess the value derived by licensees in exchange for the R&D costs incurred and risks taken by technology developers. The authors make no claim of having the expertise required to assess or measure the extent to which costs are, or are not, passed through from suppliers to manufacturers and then on to their customers, in the context of the “fierce” competition they observe. They present no econometric analysis to test their assertion that manufacturer profits are undermined or eliminated due to licensing costs being absorbed rather than passed through to their customers,



including mobile operators and consumers. The extent to which costs are passed through in the value chain is an empirical question that has not been identified, let alone properly analysed.

One cannot have it both ways

Moreover, there is a major and fundamental contradiction between the Paper and popular positions on alleged [patent hold-up](#) with regard to assumptions on the “pass through” of costs from manufacturers to consumers. As indicated above, the Paper asserts that licensing costs undermine or eliminate profits because they are absorbed by manufacturers rather than passed on in their prices to customers. This necessarily implies that reductions or elimination of such costs, or increases in margin through higher prices at constant costs, would also stay with and be to the benefit of manufacturers. In contrast, patent hold-up theory proponents seek to deprive patent licensors any share of the economic surplus generated by their technologies in standardisation—which can arise from lower manufacturing costs, higher prices at constant sales volumes or larger sales volumes at constant price—on the basis that these benefits would not simply be pocketed by manufacturers, but would, instead, be passed through to consumers. Significantly, it is quite common for proponents of royalty stacking theories in general, also to be proponents of hold-up theories, as is the case with [Carl Shapiro](#).

My response to the Paper’s main conclusions

The Paper’s main conclusions answer, incorrectly, four commercial questions:

1. What impact do royalty costs have on manufacturer profits and ability to invest in R&D?

Royalty costs do not undermine profits or diminish incentives for licensees to invest and compete. The Paper states that “the smartphone royalty stack across standardized and non-standardized technology is significant, and those costs may be undermining industry profitability—and, in turn, diminishing incentives to invest and compete.” Instead, royalty costs which are widely paid by licensees tend to be passed through to customers (including mobile operators and consumers), as are, and along with, hardware component costs and taxes. And the Paper ignores how patent royalties fund the large and growing R&D investments which enable ongoing innovations, including those by manufacturers who both pay and earn royalties, for today’s and tomorrow’s cellular standards.

Profits in this industry sector are large and growing rapidly. [According to Credit Suisse](#), handset operating profits since 2007 have tripled to \$51 billion on \$326 billion revenues in 2013. Various mobile network equipment manufacturers also derive significant profits on the basis of SEP-based and other technologies. For example, [Huawei](#) and [ZTE](#) have been doing very well for themselves with record profits recently.

The Paper even states that royalties are “like a tax that a smartphone supplier should expect to pay.” Putting aside the obvious negative connotation, this comparison is incorrect and misleading. License fees are consideration for the benefit of incorporating necessary patented technologies in the licensee’s products. Fees are paid for only by those who choose to employ the particular technologies. In contrast, taxes are imposed broadly with no choice or direct benefit in return for those who are levied.

And, in contrast to the Paper’s assumption that royalty costs go directly to the bottom line in profit reductions and profit elimination for handset manufacturers, taxes are largely or entirely



passed through to consumers. For example, European value-added-tax is levied in the range of 15% to 27% (depending on nation) at every successive stage in the value chain, including to consumers, while suppliers recover their VAT costs. Taxes can exceed the 30% aggregate royalty rate inferred in this Paper (i.e. "estimated potential patent royalties in excess of \$120 on a hypothetical \$400 smartphone") with no evidence tax charges reduce profitability. For example, imported [iPhones in Brazil are subject to 45% tax](#); but consumer prices are marked up accordingly.

Overall market demand is determined by income levels (i.e. consumer spending power) and finished goods pricing; but is only modestly affected by patent fees because these, in aggregate, represent a relatively small proportion of the finished goods prices. The common practice of subsidising handset prices, with handsets sold to consumers in a bundle including an airtime service contract, further diminishes any effects on demand from royalties; because royalties represent an even smaller proportion of total consumer costs. Consumers typically pay several times more for services over the usage life of the phone and service contract period than the unsubsidised handset price. The effective royalty rate as a proportion of total costs is therefore correspondingly much lower.

Variations in profits among manufacturers are determined by competition with differences in pricing power and disparities in costs; not by common input costs. It is the disparities with economies of scale, scope, vertical integration, purchasing power and proprietary differences in design, technology and brand value that put the likes of Apple and Samsung at an advantage with regard to their costs, pricing and product demand. Apple and Samsung generate substantial smartphone profits (up to [nearly 60% gross margins for Apple's iPhones](#)) while patent fees are paid to various licensors on these products. There is no reason to believe, and none was provided in the Paper, why cutting aggregate royalties would reduce the 100% share of mobile profits that the Paper identifies Apple (57%) and Samsung (43%) collectively command in favour of other OEMs.¹

In contrast to creating cost differences among manufacturers, patent fees paid to licensing-oriented technology companies such as Qualcomm and InterDigital are common costs that make for a level playing field which enables all manufacturers to pass on these costs in their customer prices with minimal effect on their respective competitive positions or profits. The "non-discriminatory" rates paid are reportedly similar among different licensees.

Annual R&D spending in cellular, of approximately \$40 billion in 2012, has grown 43 percent since 2008, as indicated in Figure 1. Figures include eleven large technology companies with a predominant or exclusive focus on mobile communications. Some of these are quite diversified and do not break out wireless R&D expenditures in public disclosures, so these figures include some R&D related to other technologies and product markets. However, my total excludes many companies who also invest significantly in cellular R&D; so I believe it provides a fair, yet approximate, representation of R&D investments by the mobile technology industry as a whole.

¹ The Paper fn 3.



Figure 1: Total Sales Revenues and R&D Investments for Leading Cellular Technology Companies, in U.S. Dollars and as a Percentage of Sales Revenues

	2008	2009	2010	2011	2012
Total Sales (millions)	\$399,917	\$353,836	\$401,722	\$510,840	\$555,555
Total R&D (millions)	\$27,990	\$27,854	\$30,829	\$37,922	\$39,878
R&D/Sales	7.0%	7.9%	7.7%	7.4%	7.2%

Sources: Includes public disclosures for Alcatel-Lucent, Apple, BlackBerry, Ericsson, Huawei, LG Electronics, MediaTek, Nokia, Qualcomm, Samsung, Electronics and ZTE.

Highly successful new market entry including [Apple \(2007\)](#) and [Xiaomi \(2011\)](#), and large market share gains by [Huawei and Lenovo](#) with smartphones show there are very strong incentives to compete in this market.

2. Are licensing fees fair and reasonable, or excessive and should be capped or rebased?

Licensing costs are not excessive given the value derived by licensees. There is no economic or practical reason why aggregate royalty charges for smartphone patent licensing should be limited to a proportion of hardware costs or total costs, or that royalties must be based on the "smallest salable patent-practicing unit," as demanded by the Paper's authors.

Copyright royalty charges on electronic or physical books, downloaded music or CDs, downloaded movies or DVDs, downloaded software or that distributed on CDROMs typically greatly exceed the cost of the physical medium of delivery, yet these royalties are never limited on such a basis. The manufacturing costs, profitability and players in chipset fabrication (i.e., the foundry business) are almost invariably completely different from and irrelevant to IP development cost and investment monetization factors (e.g. for 3G, 4G, Wi-Fi and video compression technologies). Similarly, ink and printing costs and competition are very different to other cost and competitive factors in authoring and book publishing. CDROM or flash memory, CD and DVD manufacturing economics and competition have little to do with any of the other costs or monetization factors in software, music or video content. Most of the many examples of royalty charges with rates cited in the Paper, including those related to cellular SEPs in particular, are based on finished product device prices because that is the industry norm, including royalty rates demanded and those agreed in patent licensing agreements. Component price-based royalty benchmarks are few and far between because they are generally not used in patent-licensing agreements.

In general, parties are free to engage in bilateral negotiations to determine royalties for portfolios of patents covered by a license agreement. That is how free markets work. In the case of the mobile communications industry, licensors and licensees often choose to value intellectual property in license agreements – corresponding to the royalty fees the licensee must pay for access to the IP – using a formula that multiplies a “royalty rate” expressed as a percentage with a “royalty base” agreed upon by the parties. The parties can negotiate the appropriate royalty rate and base they believe is appropriate for their business circumstances. In many industries it is commonplace for licensors and licensees to choose the selling price of the licensed product as the royalty base, and indeed this is the most common practice in the cellular industry where royalties are almost invariably calculated as a percentage of handset sales prices. The parties



use this approach for a number of reasons as noted below, and negotiate the appropriate royalty rate based on the IP to be licensed.

A chip-based royalty scheme incorrectly and unfairly associates royalties to costs, process economics and competitive outcomes in the silicon chip foundry manufacturing business that have nothing to do with mobile technology development costs and the market value generated from these investments in the broader ecosystem. Similarly, the applicable royalties for software licensors are not and should never be limited to the relatively small cost of burning programs onto CD ROM media. [As U.S. District Judge Leonard Davis recently put it](#), “[b]asing a royalty solely on chip price is like valuing a copyrighted book based only on the costs of the binding, paper, and ink needed to actually produce the physical product. While such a calculation captures the cost of the physical product, it provides no indication of its actual value.” Accordingly, I was [most critical of U.S. District Judge James Holderman’s chip-based damages assessments](#) in the Innovatio case.

The SSPPU is a term of art developed through patent litigation case law in the United States as one of the many ways in which U.S. district courts may value a patent or a few patents that have been found to be infringed. As the name states, the concept can only be applied where the “patent practicing unit” can be defined. In patent litigation, where one or a few patents are at issue and the scope of the claims of each patent are defined by the court, it may be possible to establish a smallest saleable patent practicing unit. But this is not a substitute for how a patent owner and a potential licensee might value a portfolio of patents as part of a license agreement. Cherry-picking the SSPPU concept and applying it out of context in portfolio licensing ignores the realities of licensing and how parties have valued patents and portfolios for decades.

Virtually every mobile phone manufacturer with a licensing program or that reveals its rates at all, including EU companies (Alcatel-Lucent, Ericsson, Nokia, Siemens), North American companies (InterDigital, Motorola, Nortel, Qualcomm), and Chinese companies (Huawei, ZTE), [has publicly stated in recent years that its mobile standard-essential patent licensing rates are based on a percentage of the entire handset price](#), as illustrated with LTE. Licensing on this basis is a long-standing practice and was widely recognized since the introduction of 2G GSM, as noted by the International Telecommunications Standards User Group in 1998 and in 2G and 3G standards by several other observers including PA consulting Group (2005), Credit Suisse First Boston (2005) and ABI Research (2007). Most mobile phone patent licensing agreements use this basis and Article 325 of China’s contract law specifically anticipates it. [European antitrust authorities](#) and the U.S. patent courts also endorse this approach. Chinese courts used this commonly-accepted royalty base in [Huawei-InterDigital litigation](#). However, in this case with application of antitrust law, royalty costs were crammed down by multiplying this base with a very low royalty rate.

Even assuming it is appropriate to apply the SSPPU concept to patent portfolio licensing, the SSPPU for many portfolios is likely to be the entire device. Narrowing the royalty base to a mobile phone’s baseband processor does not reflect numerous SEP patent claims which extend beyond this chip, including many other components throughout the device and beyond. Mobile communication is a system in which mobile devices operate in conjunction with cellular networks. For example, some patented techniques in interference mitigation are implemented in the ether in conjunction with the antenna arrays (e.g. with MIMO technologies) of both phones and radio base stations.



Costs in patent licensing, as in hardware components, are only detrimental or harmful if they are unnecessary or do not represent value for money. However, the Paper makes no attempt to assess whether aggregate royalties—even at the exaggerated levels they allege—provide net negative value, as opposed to positive value, downstream to manufacturers, mobile operators and consumers. Evidence indicates that innovative cellular technologies have been enormously valuable, and worth the associated costs, as summarised in Bullet 4., below.

3. How should aggregate royalties be counted and how much is actually paid?

It is not costing and nobody is paying anywhere near the \$120 indicated in the Paper. The authors note their estimate both understates and overstates the true royalties, but provide no indication of the magnitude of either effect, or whether the net effects are significant. The Paper states that “cross-licenses and pass-through rights could be expected to significantly decrease the monetary payments made by companies with large patent portfolios.” Nevertheless, the inaccurate \$120 figure remains prominent in absence of anything realistic, and it has therefore been picked up in [headlines by commentators who sympathise](#) with the authors’ cause.

The authors inflate aggregate royalties with double-counting. The Paper states they “have not attempted to account for a smartphone supplier’s potential to reduce its cash payments for royalties through cross-licenses and pass-through or exhaustion of patent rights.” It ambiguously and confusingly seeks to justify this by stating they “express royalty costs purely in monetary terms.” It admits that “[f]or companies with a strong patent portfolio, [e.g. cross-licensing] could eliminate cash payments altogether for certain licenses,” but hedge: “granting non-monetary patent rights is still a form of compensation and, presumably, a licensor would demand equal compensation no matter the form in which it is received.” Elimination of cash costs in this way is indeed the elimination of economic and financial accounting costs. Therefore, any cross-licensing value or cost should also be eliminated from any notional stack of aggregated licensing fees.

The associated costs including cross licensing should show up only once in economic and accounting analysis—as R&D expensed by the developer—not twice; as expensed R&D plus a notional outgoing licensing fee that is not actually paid in cash, but only paid in kind. A company’s R&D expenses can generate patented technology value for it in three ways: for its own products, for cross licensing to access rights to others’ patented technologies and to generate cash royalties. In the case of cross licensing, the total cost for the company is no more than its own R&D expense. That pays for it to be able to use its own technology plus the rights to use the technology owned by the counter-party. A manufacturer’s R&D expenses fully account for its internal rights to use the technologies developed plus the rights to use the external technologies made accessible as a result of the cross license.

Cross licensing can reduce royalties actually paid to a small proportion of the theoretical maximum aggregate royalty rate for many implementers. Nokia provides an example of how a strong patent position arising from extensive R&D can keep licensing fees low. Long after the introduction of WCDMA in 2001, [Nokia stated](#) that until 2007 it “paid less than 3 per cent aggregate license fees on WCDMA handset sales under all its patent license agreements.” Limiting aggregate royalty payments through cross licensing is a major incentive for implementers to contribute to upstream developments or acquire patents. For example, Chinese company Huawei entered the smartphone market in recent years as a manufacturer, and has then diversified vertically by developing and extensively patenting new technologies. Its R&D



investments and patenting have increased enormously. This illustrates the incentives to invest and compete are enhanced not diminished, in contradiction to the Paper's finding (Bullet 1., above).

Moreover, the figure of \$120 greatly overstates aggregate royalties even despite the disregard for cross-licensing offsets. Many of the licensing rates cited in the Paper are unrealistically high because nobody would pay anywhere near as much as demanded in various cases, even if they had nothing to cross license. For example, Motorola is shown to ask for a 2.25% royalty for each of its LTE, 802.11 and H.264 SEP portfolios. In total, this accounts for \$27 (i.e. 22.5%) of the \$120 figure. The Paper does not show that anybody is actually paying anywhere near such "headline rates." It presents no anecdotal evidence, let alone representative or exhaustive analysis across all the listed royalty demands or for smartphone manufacturers overall. In the *Microsoft* case², Motorola did not produce a single agreement showing the demanded 2.5% royalty rates. Indeed, Judge Robart observed that "the challenge in apportionment is made more difficult by Motorola's practice of providing licensees with a license to its 802.11 and H.264 portfolios at no additional charge if a licensee takes a license to its cellular portfolio." Since Judge Robart has now set the reasonable royalty rate for Motorola's H.264 portfolio at \$0.555 per unit, for example, it is clear that the real world H.264 royalty burden would be a tiny fraction of what the Paper's authors assert. Similarly, Judge Robart determined the reasonable royalty rate for Motorola's 802.11 patent portfolio to range between \$0.008 and 0.195 per unit.

The Paper also inaccurately attributes \$7.20 to Innovatio IP Ventures' WiFi patent portfolio. In that case, Innovatio did not submit a single license with a smartphone company to justify this royalty demand.³ Once again, this suggests no such license exists. And as is the case with Motorola's WiFi portfolio, now that a District Court has set a royalty rate for Innovatio's portfolio at \$0.0956 for each Wi-Fi chip used, no smartphone manufacturer would pay anywhere close to the \$7.20 per \$400 smartphone that the Paper asserts, given that there is typically only one WiFi chip per smartphone.

Similarly, the reasonable royalty rate for the Agere WiFi portfolio has been set at 0.19% of the chip price through District Court litigation, and not the \$20.00 per \$400 smartphone royalty that the Paper's authors assert comprises the royalty stack.⁴ It cannot be determined whether Agere has entered into any licenses with any smartphone manufacturers for the royalty rates that the Paper includes. Agere's Wi-Fi portfolio litigation⁵ involved a jury trial and no written opinion has yet issued on the post-trial motions.

The authors also assert that there is a \$20.00 contribution attributable to Lucent Technologies. For this component, the authors cite an April 29, 1998 letter from Lucent to IEEE.⁶ But there is substantial reason to believe that no company is paying anything close to such a royalty to Lucent. Indeed, there have been four cases involving 802.11 technologies – *Microsoft*, *RealTek*, *Innovatio*, and *Ericsson*. But in none of these cases did any party submit evidence that Lucent

² *Microsoft Corp. v. Motorola, Inc.* No. C10-1823JLR WL 2111217 (W.D.Wash. Apr. 25, 2013).

³ *In re Innovatio IP Ventures, LLC Patent Litig.*, No. 11-C-9308 2013 WL 5593609 at — (N.D.Ill. Oct. 3, 2013, MDL No. 2303).

⁴ Assuming that a Wi-Fi chip costs \$2.00-\$3.00, the royalty rate for these patents would be \$0.0038-\$0.0057.

⁵ The Paper's table at p. 25 fails to reflect the jury verdict in the *Realtek Semiconductor Corp. v. LSI Corp.*, No. C-12-13451-RMW (N.D.Cal.) case, which found that the RAND royalty for the LSI patents-in-suit was 0.19% of LSI's chip product (not the smartphone royalty base used in the table).

⁶ The Paper, p. 24, fn. 110.



was getting such a royalty for its 802.11 patents. In the *Ericsson* case, Judge Davis described the purported 802.11 royalty stacking problem as “theoretical”⁷, indicating that no such patent holder was receiving royalties of such magnitude. Moreover, the Lucent letter is very old, and was authored long before any smartphone entered the market. It is not credible to assert, based on this, single, 16 year-old letter, that Lucent is currently making \$20 per smartphone.

The Paper’s authors admit that licensing demands are negotiating positions from which they move significantly before licensing fees are agreed. They imply they “have knowledge of confidential licensing information,” but state they “do not report on it in this article, in any way.” They “report only publicly-available information,” and use it exclusively in their “bottom up” analysis; but this heavily biases results toward asking prices and away from agreed rates in executed agreements which are usually private. Negotiations can bring agreed rates right down, for example, where prospective licensees identify weak patents, when licensors are eager to complete an agreement quickly. In some cases, patented technologies are used on an unlicensed basis where no agreement is reached or sought. And yet, the Paper’s aggregation of fees is based on the headline rates demanded, for example, by Motorola, Innovatio, Ericsson and others, while there is significant evidence that such rates were not agreed and not paid. Rates paid are commonly much lower: mostly as a result of bilateral negotiations without litigation; or alternatively through litigation with royalty determinations by the courts.

The authors presumably feel justified in using headline rates because, as they put it, “they have nonetheless been sought (and received) from some licensees.” But the authors offer no evidence to support this statement even for “some licensees,” and it is far from being representative of agreed licensing terms in all technologies discussed. To the contrary, for example, Judge Robart informed me in a coffee break discussion at a conference in London this year that analysis conducted in the *Motorola versus Microsoft* case, of Motorola’s pre-existing patent licensing agreements with various parties, showed that agreed rates were far below 2.25%. He made it clear to me his decision in this case, including “reasonable royalties” determined to be two orders of magnitude below that rate, was significantly affected by that discovery.

4. Have licensing fees helped or harmed innovation and competition?

Licensing fees are helpful to the [highly competitive and flourishing smartphone ecosystem](#), not detrimental as the Paper asserts. This is a topic I have [examined extensively before](#), and so I limit myself, here, to making only a few summary remarks. By every measure the patent system and the risk-reward balance it strikes—spurring innovation, market entry and competition while not overburdening licensees—is evidently working very well with respect to:

- Subscriber and network traffic growth: This is outstanding with 7 billion mobile connections worldwide, billions of people now using smartphones with mobile broadband and data usage doubling every year.
- Increasing product and service performance: Innovations include faster baseband modems, applications and multimedia processors, higher screen pixel densities, additional sensors, improved operating system software and a flourishing apps ecosystem.

⁷ *Ericsson Inc. v. D-Link Systems, Inc.*, Case No. 6:10-CV-473 (E.D.Tx Aug. 6, 2013).



- Market entry and competition: Successful new entrants in recent years include Apple and Xiaomi, market shares have shifted enormously with supplier concentration decreasing significantly to low levels.
- Price reductions: If royalty stacking was a problem, average smartphone prices would not be falling; but the authors admit prices are falling significantly by stating [that by mid 2013] "the average price of a smartphone fell to \$375 from \$450 at the beginning of 2012." This is despite the fact that functionality and performance for the "average" handset increases substantially every year, as indicated above. Quality-adjusted prices are therefore declining even more dramatically.

Licensing fees fund technology developments and innovations that enable large and growing revenues and profits in handsets, network equipment and mobile operator services. Licensing fees contributed to the \$40 billion cellular sector R&D spending in 2012 by various companies. This investment is risky: fees help compensate for their extensive work in standard-setting organizations where most new technology submissions are rejected and some standards (e.g. WiMAX) subsequently fail in the marketplace.

Cumulative R&D, as enabled by licensing fees, was vital input in generating revenues of \$305 billion for handsets (Credit Suisse), \$55 billion for network equipment (Credit Suisse) and \$1.16 trillion for mobile operators (GSMA Intelligence) in 2012. Whereas smartphone manufacturer profits, of \$51 billion in 2013 (Credit Suisse) are currently concentrated with Apple and Samsung as aspirants including Huawei, Xiaomi and others fight to acquire large market share increases, profits are more widely spread among cellular network equipment suppliers including [market leader Ericsson](#), as illustrated in strong profit growth by [Huawei](#) and [ZTE](#) recently. For mobile operators worldwide, the average EBITDA margin (i.e. for earnings before tax depreciation and amortisation divided by revenue) is a healthy 33%, according to GSMA Wireless Intelligence. This enables and justifies ongoing annual capital expenditures by mobile operators, most significantly including 3G and 4G technology upgrades and expansions, running at 18% of sales (i.e. \$206 billion).

About this article, the author and WiseHarbor

This article was written by Keith Mallinson and initially published by [IP Finance](#) on 19th September 2014.

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