



A Compendium of Industry and Market Analysis Articles on Intellectual Property in Mobile Communications Standards

***Response to FTC Request for Comments on the Practical
and Legal Issues Arising from Incorporation of Patented
Technologies in Collaborative Standards***

Submitted June 12, 2011

Ref: Patent Standards Workshop, Project No. P11-1204

Submitted by:

**Keith Mallinson
WiseHarbor
8 Faneuil Hall Marketplace
3rd Floor
Boston
MA 02109**

kmallinson@wiseharbor.com

(617) 418 3977

Table of Contents

1	Introduction to Compendium.....	3
2	Fruits of Labour not Windfall Gains in Standardization.....	5
3	(F)RAND Works -- If it ain't Broke, don't Fix it	9
4	Patent Licensing Fees Modest in Total Cost of Ownership for Cellular.....	15
5	About the Author.....	24



1 Introduction to Compendium

This report comprises three articles published on the IP Finance blog¹. As an industry analyst with 25 years experience in mobile communications technologies and services, I was invited by IP Finance to write a series of articles on the “pricing of patented IP that is to be included in standards governed by FRAND principles”. Further details on my experience, including listings and links to many other published articles, can be found in Section 5 and on the WiseHarbor web site at www.wiseharbor.com.

Several IP Finance readers from various major technology companies have encouraged me to submit my articles in response to the Federal Trade Commission’s request for comments on “the Practical and Legal Issues Arising for Incorporation of Patented Technologies in Collaborative Standards”². For example, a Director of Standards at one of these companies wrote to me after reading the first two articles stating “I have done a great job in these two posts dispelling some of the unsubstantiated myths around the use of patents in the standards context”. He went on to write that “the FTC RFI actually asks questions that are clearly and concisely answered by your two blogs (and I suspect your third blog on upstream royalties and downstream benefits will address a couple more)”. He expressed his concern that whereas many academics believe “hold up was a real problem, but those from industry maintained that hold up was a theoretical problem created by academics”.

I present these articles as an industry expert who knows the IT and telecom industries and markets, including the IP-rich 2G/3G/4G communications sector particularly well. Cellular communications began 30 years ago and (F)RAND-based licensing has prevailed in the last decade with introduction of 3G technologies including WCDMA and CDMA2000. The FTC should consider all the well-established facts and trends with the enormous successes achieved in mobile communications and with other (F)RAND-based technologies, such as in video and audio codecs. With sustained innovation, vibrant competition, disruptive market entry, declining prices and consumer benefits so clearly increasing over many years, the FTC should demand clear

¹ “Where money issues meet IP rights”. This weblog looks at financial issues for intellectual property rights: securitisation and collateral, IP valuation for acquisition and balance sheet purposes, tax and R&D breaks, film and product finance, calculating quantum of damages--anything that happens where IP meets money. Publication web site: <http://ipfinance.blogspot.com>

² <http://www.federalregisterwatch.com/info/federal-register,ftc,request-comments-announcement-workshop-standard-setting-issues/77859>



evidence before embracing unsubstantiated theories alleging market failure or harm.

The first article "Fruits of Labour not Windfall Gains in Standardization" shows that legal and market mechanisms work well for licensors, licensees and consumers. It explains why developers of standards-essential IP justify their rewards in licensing fees. The second article "(F)RAND- If it ain't Broke don't Fix it", shows that the mobile phone markets are innovative, competitive and prices have fallen on the basis of (F)RAND licensing. The third article "Patent Licensing Fees Modest in Total Cost of Ownership for Cellular" concludes that aggregate licensing fees actually paid are likely to be significantly lower than hypothetical assessments, tend to decline over the years and are very small in comparison to total expenditures including handsets and operator services that are also dependent on standards-essential IP.

These articles are included as originally published by IP Finance, with the addition of some footnotes for readers who are reading from paper and are unable to "click" the embedded hyperlinks.

My future articles on IP Finance will examine patent pooling, other aspects of (F)RAND licensing, alleged threats and harm from non-practicing entities, open source supply and other issues with standards-based licensing.



2 [Fruits of Labour not Windfall Gains in Standardization](#)

Wednesday, 11 May 2011

In pursuance of its policy of strengthening its content relating to intellectual property as a value-generating asset with standards-setting bodies, IP Finance is pleased to host this piece by Keith Mallinson ([WiseHarbor](#)):

“Fruits of Labour not Windfall Gains in Standardization

Basic economic principles that underpin the IP system—such as being able to make a return on the capital, labour and time invested in what are typically risky developments of patented technologies—are as applicable with standards-based technologies as they are elsewhere. Many companies invest a significant percentage of their revenue, amounting to millions or even billions of dollars per year, in R&D of technologies that are then contributed for possible inclusion in industry standards.

While many companies primarily reap their rewards by selling products that implement the standards—with much of the standards-essential IP contributed by others— other companies rely on licensing to generate their investment returns. Large numbers of patents are often included within the definition of technical standards, raising a concern amongst some that the standard may not be generally available to companies for implementation on (Fair), Reasonable and Non-Discriminatory (FRAND or RAND) terms.

Those who implement standards in their equipment are typically more interested in minimizing licensing out-payments than in maximizing cash licensing fees received and so may prefer relatively low rates all round. Accordingly, some of the implementing companies and their advocates have been vocal in calling for regulatory involvement in licensing terms for standards-essential patents, including proposals to “define” the exact meaning of (F)RAND, impose limits on the aggregate licence fees for all essential patents, or to limit such fees to levels achieved before standardization (“ex ante” terms). However, if regulatory authorities were to impose such limits, the impact would likely be to impede incentives to contribute those technologies to standards or even to invest in such innovations. Imposing constraints, such as limiting licensing fees to “ex ante” levels or other arbitrary limits, will not only short-change those who relied on licensing fees to fund their developments, but discourage high-risk technology investments in follow-on standards upgrades.



Regulatory price-setting in the arena of innovative technologies neither reflects the market reality of commercial negotiation nor is it related to the costs, efforts and technical or commercial risks involved in developing those technologies. Defining (F)RAND according to an imposed pricing structure would severely limit the ability of licensors and licensees to negotiate bilateral commercial terms that reflect their respective positions and needs. There are many uncertainties involved in investing in R&D of innovative technologies.

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.

The principle of (F)RAND licensing has been broadly adopted to ensure that



patent owners who contribute technology to standards agree to make licences available to their standards-essential IP to all comers on terms that are reasonable and free from unfair discrimination, while maintaining the ability to achieve adequate reward for their innovations. There will at times be significant contention between the patent owner and implementer about what constitutes reasonable licensing terms, but this is to be expected as with commercial negotiation on any input cost component and has, for the most part, been readily resolved through bilateral negotiations. In the rare instances where such negotiations have not been successful, contract law is applicable to the (F)RAND commitment and the courts are able to deal with such disputes (although some cite examples of apparently outrageously high court award of damages to patent holders, such examples are extremely rare as have been demonstrated by independent academic researchers. See eg "Are Patent Infringement Awards Excessive?: The Data Behind the Patent Reform Debate" by Michael J. Mazzeo, Kellogg School of Management, Northwestern University, Jonathan Hillel, Skadden, Arps, Slate, Meagher & Flom LLP and Samantha Zyontz, George Mason University School of Law, available on SSRN [here](#)³).



However, in the vast majority of cases, the (F)RAND regime and bilateral licensing agreements have enabled the successful deployment and rapid growth of standards-based products and systems. Some notable examples of such successful deployments include the [GSM](#)⁴ (with four billion users) and [WCDMA](#)⁵ (with approximately one billion subscribers expected by yearend) wireless telecommunication networks. The flourishing market for mobile phones, which have transformed our business and daily lives, is evidence of the success of the economic incentives created by the IP system and the market-driven FRAND framework for licensing standards-essential IPR.

³ http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1765891

⁴ Link to GSMA Association web site: <http://www.gsmworld.com/>

⁵ Link to Wikipedia: [http://en.wikipedia.org/wiki/W-CDMA_\(UMTS\)](http://en.wikipedia.org/wiki/W-CDMA_(UMTS))





In summary, there has been no evidence of “windfall gains” to patent owners impeding the adoption of any technology-based standard. On the contrary, the rapid and extensive adoption of WCDMA and earlier GSM telecommunication standards has demonstrated the success of the FRAND discipline employed by standards setting bodies such as European Telecommunications Standards Institute ([ETSI](http://www.etsi.org))⁶ in promoting widespread deployment of networks and products utilizing the adopted standards.”

⁶ Link to organisation’s web site: <http://www.etsi.org/WebSite/homepage.aspx>



3 (F)RAND Works -- If it ain't Broke, don't Fix it

Tuesday, 31 May 2011

In this, the second in a series of features written for [Keith Mallinson](#) (WiseHarbor) for IP Finance, the author has some more positive points to make concerning (F)RAND licensing, pointing to its huge success so far in boosting technology and reducing prices in the mobile communications sector. Keith also explains the role of the Herfindahl-Hirschman Index in measuring competition within a market, showing how favourably this sector compares with those in which there is no such norm.

"(F)RAND Works -- If it ain't Broke, don't Fix it

IP licensing arrangements have promoted—not inhibited—superlative market developments in mobile communications. I quantified the enormous success of mobile technologies, including GSM with more than four billion users and WCDMA with a billion subscribers expected this year, in my previous IP Finance posting ([here](#))⁷. The rate and extent of market growth exceeds adoption of any other consumer electronic product including radios, TVs, VCRs, DVDs, digital watches and pocket calculators. Mobile technology licensing agreements on the basis of (Fair) Reasonable and Non-Discriminatory terms have ensured licensing of standards-essential technologies to all comers, with the vast majority of the IP owners willing to make (F)RAND commitments. Similarly, (F)RAND-based licensing has also been highly effective with video and audio codec technologies, including the MPEG standards, which are incorporated in all DVD players.

Perversely, there are significant moves afoot to redefine, or even replace, the prevailing system of licensing standards-essential mobile technologies on the basis of (F)RAND. A recent Federal Trade Commission [report](#)⁸ on the "Evolving IP Marketplace" airs complaints that (F)RAND is ill-defined and references demands for injunctive relief to be withdrawn from (F)RAND licensors. A popular refrain from detractors, including antitrust complainants, is that such licensing practices "stifle innovation and harm consumers", or

⁷ Link to previous article: <http://ipfinance.blogspot.com/2011/05/fruits-of-labour-not-windfall-gains-in.html>

⁸ FTC report on "The Evolving IP Marketplace; Aligning Patent Notices and Remedies with Competition, March 2011": <http://www.ftc.gov/os/2011/03/110307patentreport.pdf>



words to that effect. In contradiction to these unproven suppositions, in the real world of mobile communications, video and audio devices the stellar market growth quantified above, extensive technical and commercial innovations, significant competition and tumbling prices indicate an effective and efficient market. Consumers, in particular, are benefiting enormously. Redefining or replacing (F)RAND could undermine commercial incentives and deter many innovators from contributing to standards development. That would harm this vibrant market.

Innovation

Successive generations of mobile technology have increased massively in performance with end-user data rates increasing 1,000-fold in 20 years. 2G GSM initially provided users up to 56 kilobits per second with GPRS in the mid 1990s and 3G WCDMA provided up to 384 kbps in the early 2000s. Improvements on the latter, with introduction of **HSPA**⁹ and **LTE technologies**¹⁰ have already increased peak user speeds to several tens of megabits per second. In addition, **new research**¹¹ from UK regulator Ofcom shows that LTE will provide 2.3 times the network capacity achieved by existing 3G technologies while using the same amount of spectrum, rising to a 5.5 times gain by 2020. Other standards-based innovations have substantially improved voice encoding, reduced power consumption, and enabled multimedia messaging and location tracking.

An unprecedentedly large and increasing amount of patented IP from among dozens of patentees is required to implement mobile communications in comparison to other standards. Whereas around 561 patents families were declared as essential, **according to Fairfield Resources International**¹², in the standardization of GSM with commercial service launches from around 1993, this figure increased significantly with the subsequent technologies. According to the **database of the European Telecommunications Standards Institute**¹³, more than 4,000 declarations of IP are potentially essential to LTE.

⁹Link to Wikipedia: http://en.wikipedia.org/wiki/High_Speed_Packet_Access

¹⁰ News report on LTE service performance and pricing in Sweden: http://www.pcworld.com/businesscenter/article/203345/on_the_streets_of_stockholm_with_lte.html

¹¹ News report on Ofcom research findings: <http://www.fiercewireless.com/europe/story/ofcom-reports-230-spectral-efficiency-savings-4g/2011-05-13>

¹² Company web site: <http://www.frlicense.com/>

¹³ ETSI's IPR database FAQs: http://www.etsi.org/WebSite/AboutETSI/legalAspects/IPRdb_FAQ.aspx



These technologies and associated network services provide the shoulders upon which “smartphone” devices, such as Apple’s iPhone, can provide a communications-intensive user experience with a variety of software applications.



Research and development from a wide variety of technology companies continues unabated in creation of standards-essential and other IP for mobile communications. The 3rd Generation Partnership Project (**3GPP**)¹⁴, including ETSI and other standards organisations worldwide, is currently working on its 11th major standards release.



According to Adrian Scrase, VP International Partnership Projects, 3GPP, speaking at the LTE World Summit in Amsterdam recently, the rate of standards development since Release 8 for LTE in 2007, with **commercial services**¹⁵ using that mobile broadband technology since year-end 2009, is being maintained. Ongoing standardization work includes convergence with fixed networks, internet protocol voice and machine-to-machine communications, as well as ever faster data speeds and network capacity improvements.

¹⁴ <http://www.3gpp.org/>

¹⁵ News report on first commercial LTE services: http://news.cnet.com/8301-1035_3-10414665-94.html



Competition

The markets for mobile phones and the “baseband” communications processor chips they incorporate to implement the communications standards are very competitive. Despite the high level of patented technology incorporated in mobile communication devices, there is an ever-increasing number of manufacturers. Market share is spread much more widely than in some other IP-intensive technology markets that are not subject to (F)RAND licensing conditions, including PC microprocessors and the operating systems (OS) software used in PCs and smartphones.

Concentration in market supply can be simply and conveniently measured with an analytical method used by the U.S. Department of Justice and other competition authorities worldwide in their antitrust and merger investigations. The Herfindahl-Hirschman Index (**HHI**¹⁶: see below) is a commonly-accepted technique for measuring market share concentration. The HHI is calculated by squaring the market share of each firm competing in a market, and then summing the resulting numbers. The HHI number can range from close to zero to 10,000. The closer a market is to being a monopoly, the higher the market's concentration and the lower the level of competition. If, for example, there were only one firm in a market, that firm would have 100% market share and the HHI would equal 10,000 (i.e., 100×100). Alternatively, if there were thousands of firms competing, each with close to 0% market share, the HHI would be close to zero, representing near “perfect competition”.

According to the Department of Justice,

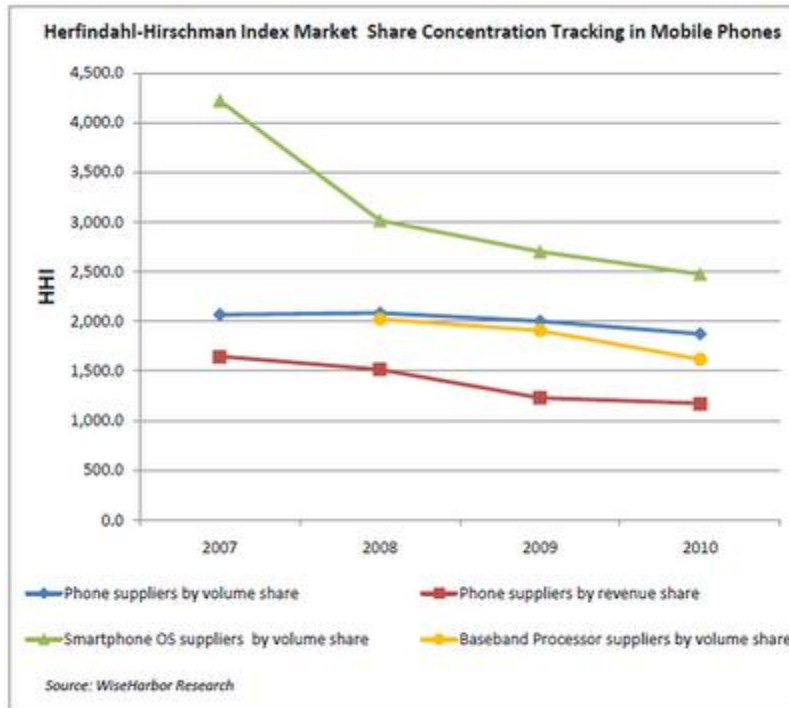
“[M]arkets in which the HHI is between 1,000 and 1,800 points are considered to be moderately concentrated, and those in which the HHI is in excess of 1,800 points are considered to be concentrated. Transactions that increase the HHI by more than 100 points in concentrated markets presumptively raise antitrust concerns under the Horizontal Merger Guidelines issued by the U.S. Department of Justice and the Federal Trade Commission.”

Handset and baseband chip markets are only moderately concentrated with market share significantly spread across several major producers. The chart shows HHIs in these markets that are around or below 1,800. They are declining due to market disruptions including Apple in phones and MediaTek

¹⁶ HHI definition by DOJ: <http://www.justice.gov/atr/public/testimony/hhi.htm>



in basebands who have entered the markets and grown to command 20% shares within five years. HTC has also grown rapidly to be a major phone supplier. Huawei and ZTE have advanced significantly in phones and lead in the supply of data dongles. New device categories including e-readers, such as Amazon’s Kindle and tablets, such as Apple’s iPad, are also disturbing the competitive environment in devices.



In contrast, the market for PC microprocessors, which is not subject to (F)RAND licensing, is highly concentrated. Intel and AMD have shares of 82% and 12% respectively with an HHI exceeding 6,500. Similarly, in the predominantly non-(F)RAND licensing of operating system software, Microsoft commands such a high market share in PCs that the HHI is around 8,000. The chart also shows the HHI for smartphone OSs, falling from 4,200 to 2,500 in the last few years. This has resulted from the demise of Nokia’s Symbian with the rise of Apple’s iOS and Google’s Android, the latter enabling multiple handset suppliers to enter the market with advanced smartphones.



Prices

Prices fall relentlessly in mobile communications; including phones, voice minutes and data services. Global average wholesale phone prices, (i.e., excluding mobile operator subsidies) have declined since 1993, when 2G technologies were first introduced, from \$560 to \$130-- representing an 8% annual reduction. Meanwhile, a large proportion of devices sold were first enriched with text messaging, then with Swiss Army-like functionality including polyphonic ring tones, colour screens and cameras from the early 2000s, and most recently with smartphone functionality incorporating the computing power of PCs or games consoles such as the Xbox 360, launched only six years ago, to provide internet access, video streaming, on-line access to apps libraries, MP3 audio and MPEG camcorder functions. The average price per voice minute, in the U.S., for example, has plummeted from 75 cents in 1993 to less than 4 cents today-- equivalent to a 16% annual reduction. **In my opinion**¹⁷, price reductions per megabyte of data consumption will be even more dramatic with latest technologies and exponential growth in demand.

Despite all the positives above, some complain that royalties are excessive in comparison to other costs. In my next article for IP Finance, I will evaluate the value share received upstream in royalties in comparison to downstream rewards in manufacture of handsets and provision of operator services."

¹⁷ News report on forecast published by WiseHarbor:
http://www.rcrwireless.com/article/20110517/WIRELESS_FACTS_AND_FIGURES/110519943/report-mobile-broadband-set-to-alter-wireless-space-through-2025



4 Patent Licensing Fees Modest in Total Cost of Ownership for Cellular

Sunday, 12 June 2011

In this, the third in a series of features written for [Keith Mallinson](#) (WiseHarbor) for IP Finance, Keith addresses the claim that the aggregate of patent licence fees paid by anyone buying into patented mobile handset technology is prohibitive and stifles competition.

"Patent Licensing Fees Modest in Total Cost of Ownership for Cellular

Patented technology is the lifeblood of today's advanced mobile handsets, network equipment and operator services. As mobile services become increasingly sophisticated, manufacturing of handsets and network equipment represents a declining share of value compared to investments in innovative mobile technologies and software. There is no inherent maximum value share for the IP created with such investments. Aggregate IP fees are a small proportion of handset costs and are very modest compared to operator service charges. Handset costs as a percentage of total ownership expenditures including operator services are 17% in the US and Canada and 13% in Western Europe.

My [previous IP Finance posting](#) showed markets for mobile phones and operator services have flourished with outstanding growth, technological innovation, significant competition and tumbling prices on the basis of (Fair) Reasonable and Non-discriminatory licensing for technologies required to implement mobile communications standards. Despite all these positives, some still complain IP fees are excessive in comparison to other costs. In this article, I evaluate fees paid upstream in technology licensing in comparison to downstream expenditures in supply of handsets and provision of operator services.

Caps to fix IP charges

There are concerted attempts to limit licensing fees in standards-essential IP. For example, downstream equipment manufacturers seek to minimize out-payments for licensing standards-essential IP by promoting aggregate royalty caps. In 2008, Alcatel-Lucent, Ericsson, NEC, NextWave Wireless,



Nokia, Nokia Siemens Networks and Sony Ericsson **announced**¹⁸ their agreement that aggregate royalties for handsets implementing the 3G/4G LTE standard should be capped below 10% of handset prices. Similarly, mobile operators, who in many cases subsidize handset prices to consumers, also seek to limit these licensing fees. A common proposal from several mobile operators is to limit aggregate essential-IP charges by establishing an LTE patent pool. Patent pooling will be the topic of my next IP Finance posting. However, one immediate and obvious observation is that if a patent pool is designed to limit aggregate license fees for the benefit of downstream licensees, then it will be unattractive to upstream licensors that depend on licensing revenue to fund continued investments in R&D and earn a return on prior investments. Also, the major vertically-integrated companies have mostly preferred to enter into bilateral agreements with other vertically-integrated companies in order to be able to negotiate cross-licenses with trade-offs between their business interests and patent portfolios.

Unproven suppositions of licensing excesses by some technology licensors and resulting harm abound by predominant voices downstream and their cheerleaders. For example, an August 2009 contribution to the European Competition Journal by Philippe Chappatte of Slaughter and May **argues**¹⁹ that:

- *There is likely to be an upward spiral of royalty claims for many standards including telecoms standards resulting in higher costs for handsets and other standardised products; and*
- *Operators will be reluctant to invest in new technologies or upgrade their networks to endorse faster and higher quality networks and the quality and range of services that will be available to consumers may be prejudiced.*

Contrary evidence is that handset prices and royalty costs have actually fallen—with handset prices, upon which royalty fees are based, declining 77% on average since 1993—despite the addition of many new technologies and increasing demand for advanced features and functionality.

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

¹⁸ <http://press.nokia.com/2008/04/14/wireless-industry-leaders-commit-to-framework-for-lte-technology-ipr-licensing/>

¹⁹ http://www.slaughterandmay.com/media/1428378/frand_commitments_the_case_for_antitrust_intervention.pdf



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](#)²⁰, 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](#)²¹ 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](#)²² 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](#)²³) 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.

²⁰ News article: <http://www.law.com/jsp/article.jsp?id=900005435384&slreturn=1&hblogin=1>

²¹ ABI Research press release on its report: <http://www.businesswire.com/news/home/20070110005662/en/High-Handset-Royalty-Rates-Inhibiting-Mobile-Phone>

²² Nokia press release: <http://press.nokia.com/2007/04/12/nokia-has-paid-less-than-3-per-cent-gross-royalty-rate-for-wcdma-handsets/>

²³ IP(R) section of NGMN web site: <http://www.ngmn.org/de/workprogramme/ipr.html>



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**²⁴ “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.

Mobile operators are as eager as ever to invest in new technologies to improve performance and lower total costs. New technology cost savings outweigh licensing fees. For example, while mobile operators spend billions of dollars on radio spectrum, technological advancements have mitigated this cost with 20-fold spectral efficiency increases and much improved voice encoding since 1G analogue cellular. Operators worldwide are investing extensively in advanced technologies **HSPA+**²⁵ and **LTE**²⁶ that have increased network capacity and maximum end-user data speeds 1,000-fold since the introduction of 2G technologies around 1993. In the US, for example, all the major operators (and smaller ones too) claim to have introduced “4G services” over the last couple of years. Operators are also making major investments in associated devices by significantly subsidising end-user prices. With demand for HSPA+ and LTE so strong, IP cost issues can be no more significant than they were with previously and currently successful 2G and 3G technologies.

Increasing value share in software and patents

There is no reason why any arbitrary percentage limit should be imposed on IP costs. It is widely accepted that when one pays, for example, \$25 for a hardback or \$10 for a paperback book, production costs in printing account for but a small proportion of these figures. Royalties to authors, illustrators

²⁴ Published statement by counsel for 3G Patent Platform Partnership: <http://www.mondaq.com/unitedstates/article.asp?articleid=20207>

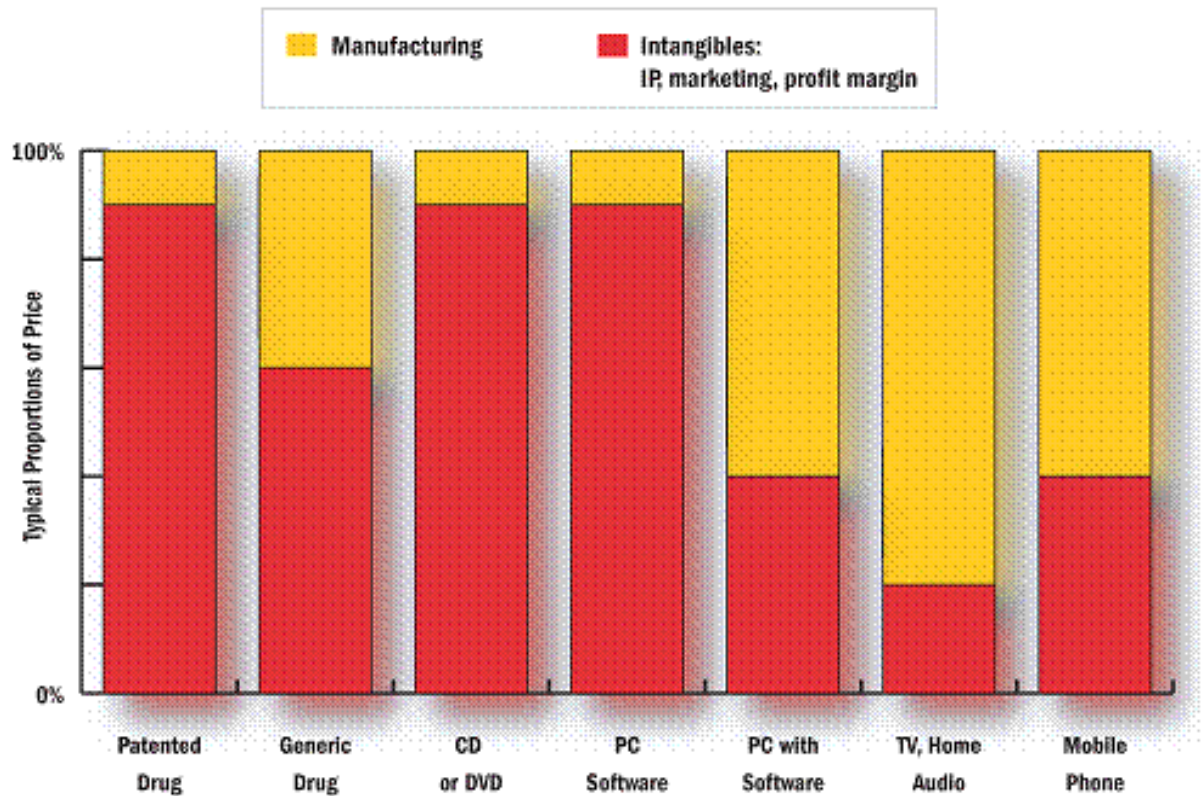
²⁵ Press report on T-Mobile USA’s 42 Mbps network upgrade: <http://www.telecoms.com/28123/t-mobile-usa-launches-42mbps-hspa-network-upgrade/>

²⁶ Verizon Wireless web site overview on its LTE roll out: <http://news.vzw.com/LTE/Overview.html>



and agents as well as costs in distribution, marketing and the publisher’s profit margin account for the vast majority of these prices. Similarly, other IP-intensive products, as illustrated in Exhibit 1, have a significant proportion of costs in the intangibles.

Exhibit 1: Manufactured content value varies substantially by product category



Source: WiseHarbor

I have [predicted²⁷](#) a marked trend of increasing value with the intangibles in mobile devices—including embedded and aftermarket software predominating over hardware—since Apple’s 2008 3G iPhone launch. The success of the iPhone including its Apps store proves my point. The iPhone

²⁷ WiseHarbor presentation used at a conference in 2008:
http://www.wiseharbor.com/pdfs/WiseHarbor_LTE_handset_11.08.pdf



leads the smartphone market²⁸ and has a manufacturing cost around just one third of its **\$600**²⁹ average wholesale pricing (before operator subsidies to consumers). Gross profit margins approaching 60% provide a significant return on investments in software, brand and distribution, while Apple largely relies on the essential IP developed and contributed to mobile standards by others.

Handset, network and services-essential IP

Mobile phones are inextricable from the networks and operator services with which they are used: licensing fees should be considered in this broader context. In contrast to technologies that can be used offline, such as in audio and video players, standards-essential IP is implemented end-to-end in handsets and network equipment with the provision of cellular voice and data services. In addition to increased speeds and network capacity, end-to-end innovations include voice encoding, encryption, automatic roaming and location tracking. A handset in isolation from a network cannot make calls or receive data, let alone exploit any of these capabilities. By convention, licensing fees are charged on wholesale mobile phone prices. Whereas this royalty base is simple and convenient to administer in licensing, it overlooks where most ecosystem value is generated—in operator service revenues. In fact, phone prices are commonly subsidised—to substantial extent in many cases—by operators in anticipation of these revenues.

The average service life of a phone from purchase until retirement is around 20 months in the US where postpaid contracts predominate and 34 months in Western Europe where most users have prepaid or SIM-only service with unsubsidised phones. Exhibit 2 shows that during a handset's service life, consumers spend on average around five or six times more on service fees than they or their operators spend on the handset. Handset costs in the US/Canada and Western Europe represent 17% and 13% respectively of total ownership expenditures including handset costs and operator service charges.

²⁸ Press release on results of iSuppli's "teardown" with estimated manufacturing costs for iPhone: <http://www.isuppli.com/Teardowns/News/Pages/iPhone-3G-S-Carries-178-96-BOM-and-Manufacturing-Cost-iSuppli-Teardown-Reveals.aspx>

²⁹ Financial analyst's estimated profit margins on iPhone: <http://venturebeat.com/2009/07/29/att-subsidy-of-375-boosts-apples-iphone-profit-margin-to-60-percent/>



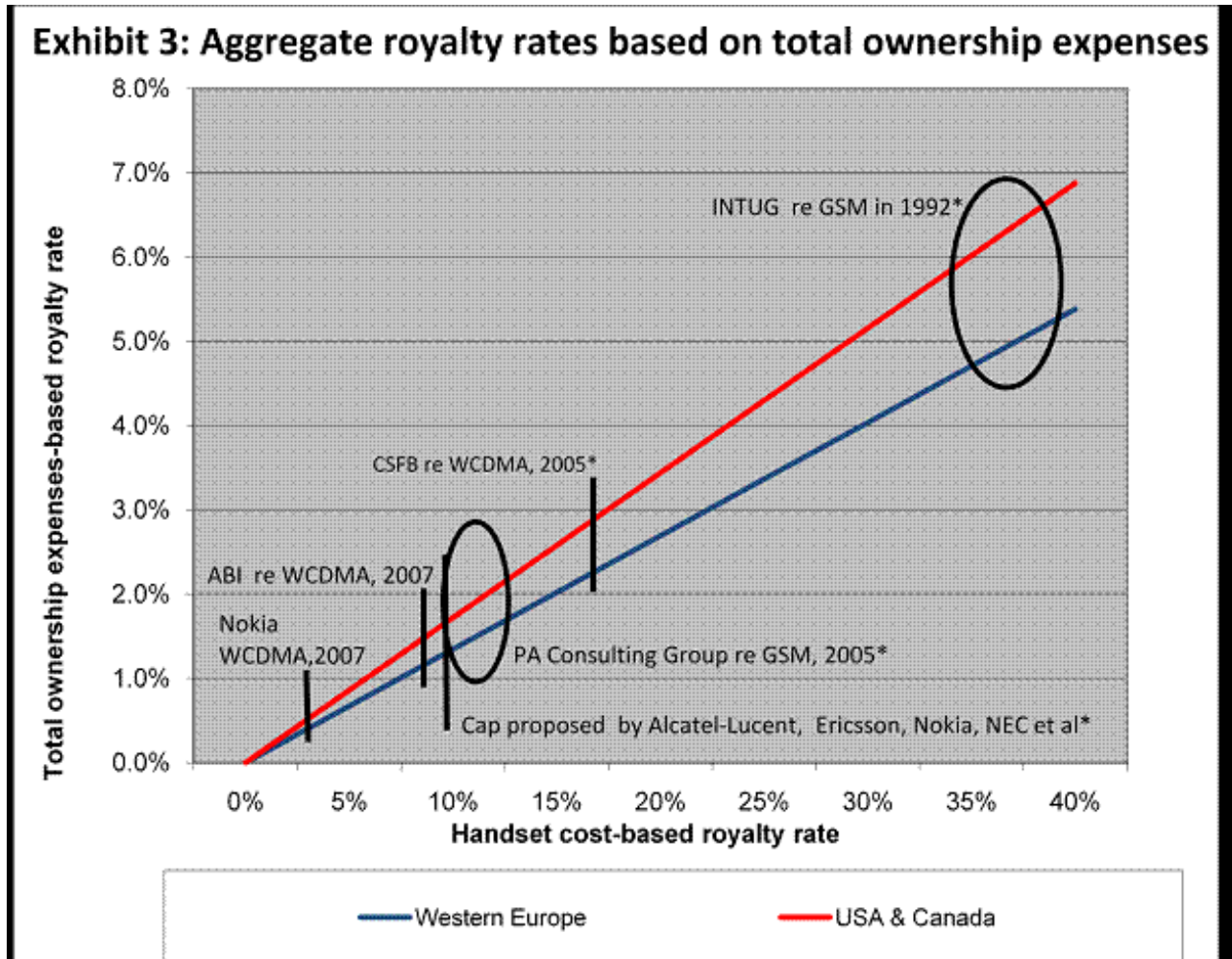
Exhibit 2: Handsets, a small proportion of total ownership expenses

	US and Canada	Western Europe
Average service revenue per user (per month)	\$50	\$32
Service life (in months)	20	34
Total operator services expenditures	\$1,001	\$1,087
Average unsubsidised wholesale phone price	\$207	\$167
Total lifecycle expenditures	\$1,208	\$1,254
Handset cost/total expenditures	17%	13%

Source: WiseHarbor, based on 2009 and 2010 market figures



Royalty rates expressed as a percentage of total ownership lifecycle expenses are therefore much lower than rates based on handset prices. Exhibit 3 shows that converting aggregate handset cost-based royalty rates to rates based on total ownership expenditures reduces the rate to 13% and 17% of the rate based on handset costs for Western Europe and US/Canada respectively. More frequent handset upgrades in the US account for most of the differences between the two regions.



Source: WiseHarbor Research * For companies with no IP to trade



Competitive advantage with IP

It is not the average level of IP charges that affects competition; it is the different rates paid among competitors. Aggregate royalty rates are significantly less than European Union VAT rates that have mostly ranged from 15% to 25% in recent years. Applied uniformly among competitors, taxing phones and services at these VAT rates has not significantly impeded their sales versus nations where consumption taxes on phone sales are much lower.

The asymmetry in licensing costs between manufacturers with IP who can cross-license to minimise their licensing expenditures and manufacturers without essential-IP patents who must pay more is a significant competitive factor. Manufacturers are faced with a business choice: bear the up-front costs and risks of investing in technologies with the aim to cross-license for much of the essential IP required, or pay to license others' IP. Investing up to several billions of dollars per year in R&D in the hope that some of it will prove effective enough to be accepted in leading mobile standards merits competitive benefits and commercial returns. Nevertheless, latter-day cellular market entrants including Research in Motion, HTC, Apple and others succeeded with little or nothing in the way of essential IP at the outset."



5 About the Author

Keith Mallinson is founder of [WiseHarbor](http://www.wiseharbor.com)³⁰, providing expert commercial advisory to technology and services businesses in wired and wireless telecommunications, media and entertainment serving consumer and professional markets. He is a regular columnist with [Wireless Week](http://www.wirelessweek.com)³¹, [FierceWireless Europe](http://www.fiercewireless.com)³² and [IP Finance -- "where money issues meet intellectual property rights"](http://ipfinance.blogspot.com)³³.

Mallinson's recent clients at WiseHarbor include several mobile phone technology IP owners. His work includes various other commercial issues as well as IP. He provides advisory services including market analysis and forecasts for operator services, network equipment and devices. He also has significant testifying expert witness experience in the cellular sector, but has not yet testified on matters relating to standards-essential IP.

Mallinson led Yankee Group's global Wireless/Mobile research and consulting team as Executive Vice President, based in Boston, from 2000 to 2006. His responsibilities also included consumer media and enterprise communications. Until then, he had overall responsibility for the firm's European division, based in London, as Managing Director from 1995 until 2000. He was the European Research Director prior to 1995.

Mallinson has 25 years experience in the telecommunications industry, as research analyst, commercial consultant and as a testifying expert witness. Complementing his industry focus, he has a broad skill set including technologies, market analysis, regulation, economics and finance. He has published numerous reports and speaks publicly at industry events such as the leading Mobile World Congress and CTIA trade shows on a wide variety of topics including next generation broadband network technology adoption, fixed mobile convergence, semiconductor technologies, intellectual property patents and licensing, emerging markets in developing nations, mobile operating systems, search and advertising.

³⁰ Company web site: www.wiseharbor.com

³¹ Publication web site: www.wirelessweek.com

³² Publication web site: www.fiercewireless.com

³³ Publication web site: <http://ipfinance.blogspot.com>



Mallinson started his career in military communications design and project management with the UK Ministry of Defence. Prior to studying for his MBA he worked as a minicomputer systems engineer for electronic security company Cardkey Systems. For several years he served as a Director at a seed capital investment firm specializing in information and communications technologies as well as biotechnology.

Mallinson has an undergraduate electronic engineering degree from London University's Imperial College and an MBA from the London Business School, including an academic exchange with Northwestern University's Kellogg Graduate School of Management in Illinois.

