IP valuation in the digital economy

With more consumer activity taking place online than ever before, it is imperative to find ways of measuring the economic value added by technologies that enable e-commerce, especially when it comes to calculating awards for patent damages

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A fundamental business imperative for any company is to increase sales revenues and profits by driving customers to purchase more products and services. In the traditional bricks-and-mortar retail environment, companies tend to focus on three key goals: attracting, retaining and upselling customers. While these goals remain the same in the e-commerce environment, the tools and techniques used to pursue them are often quite different, with patented technologies often playing a crucial role.

In a traditional setting, a retailer might try to attract customers through elaborate window displays or by positioning more expensive items at eye level in the most popular areas of the store. Traditional content providers such as newspapers and cable companies might create an appealing package of content and monetise their products or services with subscription fees or paid advertising.

In an e-commerce setting, however, an online retailer will resort to various technologies (eg, well-designed websites, targeted display advertising and sophisticated digital subscription models) to attract, retain and upsell customers. Attracting, retaining and upselling customers — and accessing and protecting the technologies that facilitate these goals — are especially important online, due to the presence of direct and indirect network effects, and also because customers can move more easily between websites than between bricks-and-mortar stores.

Such technologies can be extremely valuable to online retailers, even though the specific functionalities they provide do not correlate directly to the price paid by end consumers for the product or service. As a consequence, when technologies are not priced in a manner that is commensurate with their overall business value, it can be difficult to estimate their value in the context of patent damages. Indeed, some of the standard techniques for estimating value are not necessarily well suited or well adapted to applications in modern online business environments.

Three core economic challenges in retailing

Traditional bricks-and-mortar retail outlets use a variety of strategies to attract customers to their stores, including advertising and marketing efforts. For example, a supermarket might advertise low-priced milk and other consumer staples as so-called 'loss leaders', which are designed to drive increased customer traffic. The next challenge is to retain customers in order to develop repeat business and drive sales and profits over the long term. This is typically achieved through features such as a pleasant retail shopping environment, well-organised merchandise, informative store displays and knowledgeable store clerks. Finally, such retailers must find ways to induce marginal customers to make additional purchases and to upsell higher-margin goods and services (eg, packaged convenience foods near the checkout counters in supermarkets) to

Figure 1. **The positive impact of a well-designed retail environment**

The bad

The good

existing customers. Often this is achieved via the use of retailer-provided point-of-sale services, which can help to drive sales and profits. Figure 1 illustrates the positive visual impact of a well-organised display which takes advantage of carefully curated cross-selling opportunities.

There is extensive literature on the techniques employed by retailers and manufacturers to pursue these core goals. For example, Marvel (1982) explains that manufacturers can generate increased demand for their products through national advertising and other brand-enhancing investments, enabling them to offer retailers physical products bundled with a set of likely customers. However, if such manufacturers attempt to charge retailers for this customer flow by increasing their wholesale prices, retailers can retaliate by directing their customers to alternative products which deliver higher margins, while still benefiting from the manufacturer's branding efforts. By imposing exclusive dealing (ie, requiring a retailer to carry only the manufacturer's products), manufacturers can prevent their customer flow from being diverted and protect their brand-enhancing investments.

As another example, Klein and Murphy (1988) explain that point-of-sale services designed to increase demand from marginal consumers are often extremely important in certain retail contexts. They show how manufacturers can use a variety of contractual terms (eg, exclusive territories, resale price maintenance and exclusive dealing) to create profit streams for retailers which, when combined with monitoring by the manufacturer, give retailers the incentive to perform the desired point-of-sale services.

How are things different in the digital economy?

Online retailers are faced with the same core challenges as bricks-and-mortar retailers — attracting, retaining and upselling customers. Retailers in both environments need good content, competitive prices, an attractive retail environment and good customer service. However, the tools and techniques used to achieve these goals differ online.

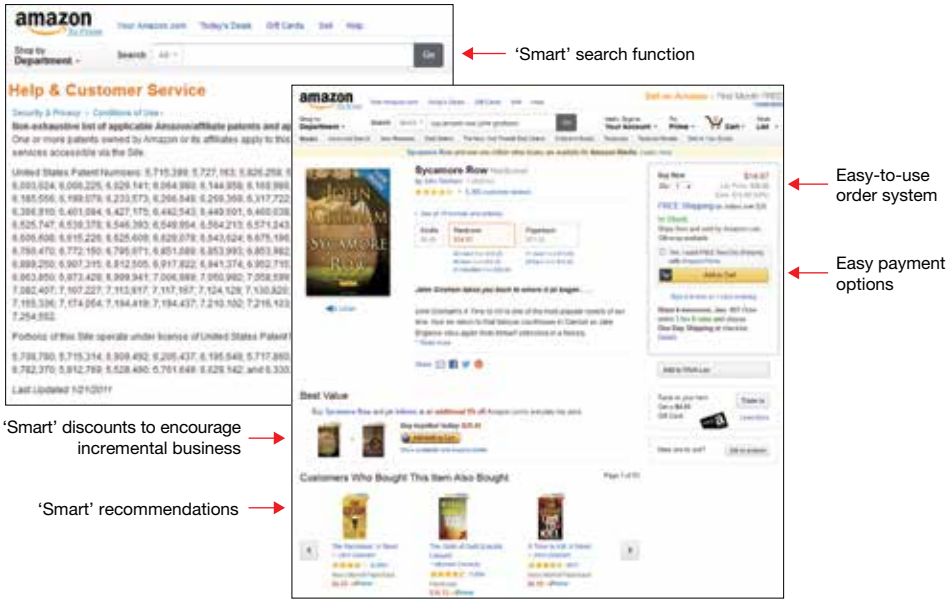
Whereas a bricks-and-mortar retailer might provide an inviting storefront, an online retailer can offer a full featured and easy-to-use website. Similarly, while a bricks-and-mortar retailer might place items that are commonly purchased together next to one another on the store shelves, an online retailer might place links or advertisements for products related to the one that a consumer just purchased at the bottom of a webpage.

Patented technologies can enable innovative online retailing strategies

A variety of innovations have been developed and deployed in modern e-commerce environments to pursue the three core challenges of attracting, retaining and upselling customers. These include:

- search and guidance technologies, which help customers to find online content to purchase;
- integrated product information and consumer reviews, which provide customers with ready access to

Figure 2. **Patented technologies enable e-commerce innovations**



information relevant to purchase decisions;

- embedded preview functionalities (eg, film trailers), which encourage customers to sample and then purchase;
- links to related products and services (eg, a shirt with the characters from a cartoon that a user's children just streamed or an audio soundtrack to a film that the user just watched), which provide easy options for customers to make incremental purchases; and
- use of location-aware mobile devices to encourage cross-selling between bricks-and-mortar locations and e-commerce environments (eg, receiving mobile advertisements when you are physically near a bricks-and-mortar store and links to e-commerce websites of physical stores that you have visited recently.)

In an online retail environment, where customer stickiness can be a greater challenge and where scale and direct and indirect network effects are often important factors, these types of innovation can be particularly important. They can enable modern e-commerce websites to offer far more targeted and customised solutions than is possible in a bricks-and-mortar context.

In the e-commerce environment, customers interface with a computer, tablet, smartphone or television and can move freely between websites, making comparison shopping, one-trip purchases and content surfing far easier for the consumer – and retaining and upselling customers more difficult for the online retailer. Moreover, some of the techniques and incentive structures used in bricks-and-mortar retailing (eg, vertical contractual provisions, such as exclusive territories or exclusive dealing) are harder to implement in the online world, making innovations and technological solutions all the more important.

The particular nature of e-commerce and the electronic provision of content makes innovations that facilitate customer retention and upselling especially important. What is more, the intellectual property accompanying those innovations can be critical in helping companies to attain marketplace success. Patents that facilitate the pursuit of these three core economic challenges in retailing can therefore be fundamental drivers of enterprise value. As an example, Amazon's e-commerce website, displayed in Figure 2, uses various patented technologies and takes advantage of several strategies to attract, retain and upsell customers. It offers a well-structured website with easy-to-use search functionality, embedded product recommendations and easy-to-use purchase and payment options.

There is substantial empirical evidence to support the increasing importance of patents and patent portfolios. *The Economist* recently reported that technology licensing in the United States generates approximately $45 billion annually (approaching $100 billion worldwide), and that as much as three-quarters of the value of publicly traded companies may relate to intangible assets such as intellectual property and brand value. Figure 3 shows the value of recent major patent acquisitions and licensing agreements in the technology and e-commerce space and, where applicable, the market capitalisation of the seller shortly before the intellectual property was transferred. In some cases, the firm's intellectual property represents a substantial portion of the market capitalisation of the company at the time.

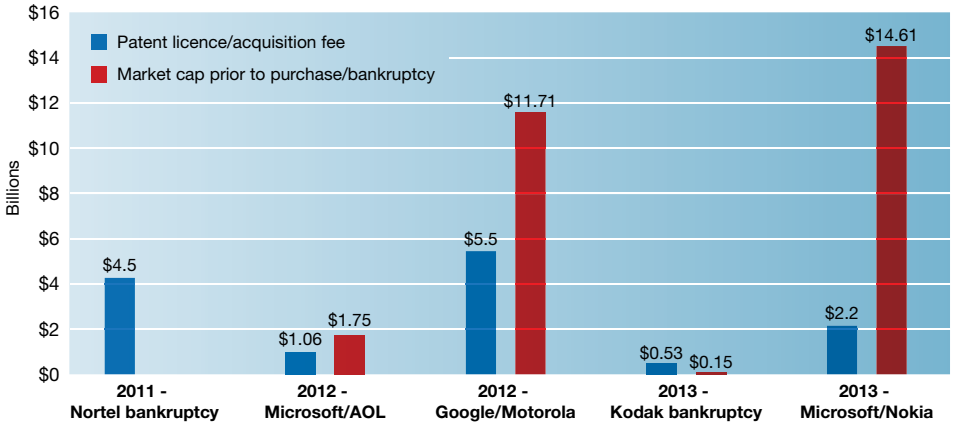
According to the US Patent and Trademark Office, recent patent and trademark activity has been prevalent in the telecommunications, data processing and IT spaces. However, there is reason to believe that some of the value attributable to this intellectual property is being overlooked by conventional measures of economic activity – particularly when that value is not incorporated into the prices of products that are sold to consumers or otherwise captured through licensing activities.

As noted by Brynjolfsson and McAfee (2013), traditional measures of economic

activity such as gross domestic product (GDP) can fail to capture the value of information, innovation and other services provided for free in the digital economy. As one example, if a computer owner chooses to use a free online version of Linux rather than purchase a copy of Microsoft's Windows operating system, GDP will be lower by the retail price of the Microsoft software package. Something similar happens if a user chooses to switch from a print subscription to the *New York Times* to a free online aggregator service, such as Google News.

Even though traditional measures of economic activity do not always capture the value of new products or innovations and, as discussed later, traditional approaches to valuing intellectual property are not necessarily well suited to measuring that value, this does not mean that such new products and innovations are unimportant in the modern digital economy. Indeed, in recognition of the importance of intangible knowledge and entertainment-based assets, the Bureau of Economic Analysis recently reclassified expenditures on such things as investments instead of direct expenses.

Figure 3. **Patent portfolios contribute substantial value to companies**



Notes:
1) Bankrupt Nortel sold its patent portfolio to a bidding collective for $4.5 billion (*New York Times*, February 13 2012).
2) AOL sold 800+ patents to Microsoft and granted it a licence to the rest of its portfolio (AOL press release, April 9 2012).
3) Google attributed $5.5 billion of its $12.4 billion purchase of Motorola Mobility to patents and developed technology (Google 10Q filing, June 2012).
4) Bankrupt Kodak received over half a billion dollars for the sale and licensing of its patents (Kodak press release, December 19 2012).
5) Nokia granted Microsoft a 10-year licence to its patent portfolio for $2.2 billion (Trefis, September 3 2013).

Innovations can be valuable even when not priced directly

In many technology-based industries, the full value of a particular feature or service is often not reflected in the price paid by end customers. In some cases, this is because the manufacturers and retailers do not want to price these features or services separately, precisely because they are used to induce incremental purchases from marginal customers.

In other cases, the priced services (eg, advertising) might not be the products or services where the patented technology is directly applied. For example, the provision of online goods and services often occurs in complex multi-sided markets. In such markets an intermediary supplies a platform that connects multiple distinct groups in ways that are beneficial for all members of the ecosystem. As an illustration of this phenomenon, Figure 4 shows how YouTube provides a platform that is used jointly – although in different ways – by video consumers, advertisers and content producers.

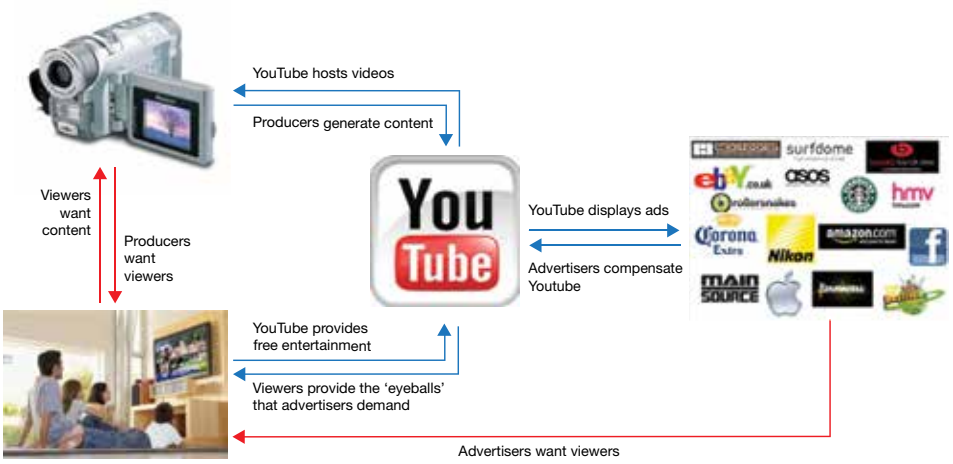
YouTube connects consumers and content providers for free and generates income by selling advertising space to third parties. Yet YouTube employs numerous technologies and techniques to attract and retain viewers (eg, by providing viewing recommendations based on users' previous actions, easy-to-use search functions and top video recommendations). While YouTube does not explicitly charge video consumers, content providers or advertisers for these innovations, they offer value to each member of the ecosystem.

In online business models, user traffic metrics (ie, clicks and eyeballs) are extremely important. Much as in television and print advertising, online advertisers often pay a certain amount to platform providers based on the number of viewers who are exposed to an advertisement on the platform. Moreover, advertisers are often willing to pay more for advertisements that are more likely to reach a targeted demographic.

This means that innovations which allow advertised offerings to be better targeted at consumers create value for advertisers and other ecosystem members. It also means that innovations that encourage consumers to return to a website (ie, facilitate customer retention) can often be monetised through increased advertising revenues and/or subscription fees. Under a subscription model, bundles of products and services are offered to end consumers in exchange for a set monthly or annual fee. Subscription models are becoming increasingly important in many technology-driven industries, including the provision of digital music, video and literature.

Critical mass is often important for marketplace success in many technology-

Figure 4. **Economic ecosystems in multi-sided markets: YouTube**



driven industries, due to the presence of both direct and indirect network effects. For example, an online platform or content provider must reach a sufficient number of users to make it economically worthwhile for an advertiser to design and run advertisements on that platform. Similarly, content producers will likely achieve a greater benefit from contributing their content to platforms with a large audience. As a platform begins to achieve dominance in a market, it can enter a virtuous cycle of attracting more content, which then attracts more viewers and advertisers, which in turn attracts more content. Evidence of this virtuous cycle can be seen in the performance of several online technology platforms today, including Google, Amazon, eBay, YouTube and Twitter.

Given these dynamics, full feature sets which permit a wide range of online retailing strategies are often important for attracting initial platform traffic, helping companies to attain critical mass in generally competitive market environments and realising the full benefits of both direct and indirect network effects. For example, in the recent smartphone platform wars, the development of large numbers of high-quality apps for the iPhone and Android OS platforms coincided with sales share gains of these platforms relative to Microsoft and BlackBerry.

Thus, technological innovations which facilitate features and services that help online businesses to attract, retain and upsell customers can be valuable even when end consumers do not pay separately for those features or services. When such innovations are enabled by patents and patent portfolios, there can be significant challenges – especially in light of recent evolutions in case law – in calculating the value of those patents.

Valuing patents and patent portfolios

The economic value of patents is generally driven by the marketplace advantages that they confer and by the amount for which they can be licensed or sold. These factors are, in turn, substantially influenced by the likelihood that patent rights can be successfully enforced and by the expected penalties faced by potential infringers. US patent law provides for damages "adequate to compensate for the infringement, but in no event less than a reasonable royalty" (*Georgia-Pacific Corp v US Plywood Corp*).

In the modern digital economy, some traditional approaches to estimating a reasonable royalty are not necessarily well suited to valuing patented technologies that are incorporated into products and services, especially when these are not priced separately. Computational challenges can also arise when patents are generally licensed only in conjunction with a broader portfolio. Recent changes in case law have further constrained the set of permissible techniques for calculating patent damages in a number of circumstances.

The process of calculating economic damages is often divided into an estimation of a reasonable royalty rate and the calculation of a royalty base to which that rate should be applied. Both of these tasks can be more challenging for the types of product and service supplied in online environments.

Royalty base

Case law regarding the appropriate royalty base for a reasonable royalty analysis has evolved significantly in recent years. For example, the court in *LaserDynamic v Quanta* held that it is inappropriate to use the full price (or "entire market value") of a multi-component product that incorporates both patented and unpatented features as a royalty base unless it can be shown that "the patented feature drives the demand for [the] entire multi-component product". As another example, the court in *Uniloc v Microsoft* found that the disclosure of the defendant's sales revenues for the entire infringing product "cannot help but skew the damages horizon for the jury".

Given that many modern technology-based products and services incorporate many different features based on many different technologies (and patents), as a

practical matter it can often be difficult to establish that any particular feature of the product is the sole factor driving demand (or otherwise to apportion the value of the feature at issue from the value of the product or service overall). However, this does not mean that such features (and the patents that support them) do not drive substantial value for end users and hence for the firms that supply such products. For example, patented technologies that enable certain features of smartphones (eg, faster data speeds or the ability to perform multiple tasks simultaneously), or which support a robust and efficient operating system on the device, can provide substantial value to end users even though those features are bundled together with many other features in a complex product sold at a single price.

In part to help address this apportionment issue, courts have sometimes focused on a royalty base comprised of the price of the "smallest salable unit which embodies the patented technology" (*LaserDynamics v Quanta*). However, this approach can be challenging when, for example, services based on the patented technology are not sold, but instead are provided for free to attract customers for other products and services. For example, YouTube recommends video content to users without charge, based on past actions and user profiles. This recommendation service, which is built on a variety of (patented and non-patented) technologies, can be expected to increase the number of videos viewed by each visitor and thereby increase YouTube's advertising revenues.

In such circumstances, the best economic metrics for capturing the use and value of the patented technologies may be the increased page views and associated increased advertising revenues driven by the recommendation service. Consequently, it may make little sense, from an economic perspective, to focus on a smallest saleable unit when attempting to calculate an appropriate royalty base for the purpose of patent damages.

Royalty rate

A variety of different techniques are commonly used to determine reasonable royalty rates in patent litigation. However, the set of available techniques – and the circumstances in which they can be applied – have been curtailed by the courts in important ways in recent years. Perhaps most notably, the court in *Uniloc v Microsoft* rejected the use of the so-called 25% rule of thumb – under which a reasonable royalty rate was assumed to be equal to 25% of the expected profits generated from sales of the product containing a patented invention – because this approach "fails to tie a reasonable royalty base to the facts of the case".

Another common approach to estimating a reasonable royalty is the so-called 'comparables' approach, which is based on an analysis of existing licence rates for the patents in suit or for comparable patents, taking into account, among other things, the scope of the technology licensed, the characteristics of the licensee and the use of the patented technology by that licensee. As the court in *LaserDynamics v Quanta* put it: "Actual licenses to the patented technology are highly probative as to what constitutes a reasonable royalty for those patent rights."

However, the comparables approach has also been partially curtailed in recent years, at least with respect to the circumstances in which it can be applied. For example, the court in *LaserDynamics v Quanta* also stated that "alleging a loose or vague comparability between different technologies or licenses does not suffice". Moreover, the courts in *ResQNet v Lansa* and *Lucent v Gateway* rejected both the use of general industry surveys on royalty rates and the use of licences that were in the same general field as the product at issue as insufficiently comparable for use in a reasonable royalty analysis.

A further common challenge with implementing a comparables approach in the context of high-tech patents relates to the common practice of licensing such patents as part of a broader portfolio licence. It is commonplace (and sensible from an economic perspective) for companies to license entire portfolios of patents that relate to a product or group of products rather than to enter separate licences over subsets of the portfolios. Such portfolio-wide licensing reduces transaction costs for both parties and increases design flexibility for the licensee.

However, in the context of litigation, firms generally choose (or are only allowed by courts) to assert claims related to a small subset of their patent portfolios. If the rates specified in existing portfolio-wide licences are used as reference points in a litigation, the damages expert often faces the challenge of apportioning the royalties specified in the portfolio licences between the particular subset asserted in that litigation and the other patents contained in the existing licences, but not asserted in that litigation.

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Action plan

New technologies and innovations are extremely valuable to online retailers and other participants in the modern digital economy, but it can often be difficult to estimate their value in the context of patent worth and patent damages. Here are some strategies for addressing the problem:

- Recognise that patented technologies can enable innovative online business strategies, and that the intellectual property accompanying those innovations can be critical in helping companies to attain marketplace success.
- Understand that innovations have value even if customers do not pay for them directly.
- Acknowledge that traditional measures and techniques sometimes fail to capture adequately the value of information and innovation provided for free in the digital realms.
- Rethink and adapt traditional techniques for estimating patent value.
- Employ new approaches to determine IP value in the digital economy.

In relation to the patent portfolio apportionment issue, according to both economic theory and the available empirical evidence, not all patents are equally valuable; indeed, the distribution of patent values tends to be highly skewed. Assigning an equal value to all patents within a portfolio therefore makes little sense as a matter of economics. A number of approaches to handling this apportionment issue have been tried, with mixed results. These include:

- valuing patents based on the number of later patents that cite them;
- ranking the value of all patents in a portfolio and applying patent value distributions from the economics literature; and
- relying on qualitative evidence of the relative importance of the patents at issue to other licensees.

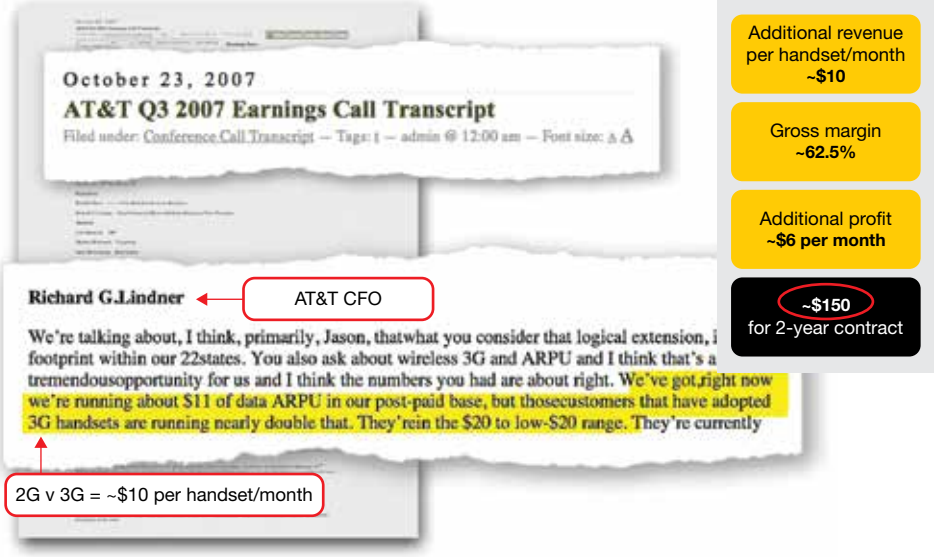
As old rule-of-thumb methods have been supplanted, data-driven analytic methods that focus on the economic benefits enabled by the patented innovation are becoming increasingly prominent. For example, another commonly employed method for estimating a reasonable royalty is the bargaining range approach. Under this approach, a reasonable royalty negotiated between a willing licensor and a willing licensee can be expected to fall somewhere in the range between the minimum amount that the licensor is willing to accept for a granting a licence to the patent and the maximum amount that the licensee is willing to pay for the patented technology.

The maximum willingness to pay is generally determined by the value of the patented technology to the licensee over the best commercially and technologically viable non-infringing alternative available to that licensee. When such technology is not priced separately in the market, this value is more difficult to measure. However, potential data-driven approaches to the valuation issue have been developed and employed with some success, including estimating design-around costs, using natural experiments or other market data and generating consumer survey evidence.

The design-around cost approach focuses on the cost to a company (often measured in time, money and/or opportunity costs) to design around the patented technology at issue. However, commercially viable non-infringing alternatives can often be difficult to establish since, from an economic standpoint, they should avoid all patents in a portfolio (not just those specifically asserted in a particular litigation), and cannot rely on other patented technologies without accounting properly for the cost of accessing those other technologies.

Naturally arising market experiments occur when available products vary in such a way that the value of a particular set of features can be determined using market data. For example, if two bundles of products are sold in a market – one with the patented feature and one without – the price differential between the two products can be indicative of the value of the patented feature. This approach can also be adapted to cases where the patented features are provided for free. For instance, if a particular patented functionality was added on a specific date, changes in user traffic, advertising revenues or average revenue per user in the period before and after the launch of that feature may be indicative of its value to the company. As an example, Figure 5 depicts a simple analysis of the incremental value to a cellular provider of offering faster wireless data speeds, based on a comparison of estimated profits generated by users of 3G-enabled smartphones versus 2G-enabled smartphones. However, such natural experiments arising in markets are often inherently time sensitive and can be affected substantially (both positively and negatively) by the introduction of subsequent technologies and innovations. It is also important to consider whether

Figure 5. **Determining incremental profit using natural experiments**



NB: Gross margin taken from AT&T 2007 10-K filing for the year ending December 31 2007, management's discussion and analysis of financial condition and results of operations, p6

factors other than the patented technology may be affecting the results.

Consumer surveys have also been used to assess customer demand for patented features, to apportion value between the patented and non-patented features, and to assess consumer willingness to pay for products that are provided for free in the marketplace. For example, one might ask potential consumers to choose between hypothetical bundles of products (some of which include the technology at issue) that have been randomly assigned reasonable prices. Statistical methodologies can then be applied to estimate the increase in consumer demand associated with the patented feature in the product or to estimate how much a consumer is willing to pay to have the patented feature included in the product.

New approaches

Innovations that help businesses to attract, retain and upsell customers in the digital economy can be extremely valuable, even if end consumers do not pay for them directly. Unfortunately, the value attributable to these innovations is often overlooked by conventional measures of economic activity and is not necessarily measured well by some traditional approaches to estimating patent damages – particularly when that value is not incorporated into the price of products that are sold to consumers or otherwise captured through IP licensing. As such, some of the standard techniques for estimating portfolio value and patent damages are falling short in today's digital economy. New approaches to IP valuation must be implemented to meet the needs of today's modern online business environment. *iam*

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